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IN THE

Supreme Court of the United States

OCTOBER TERM, 1942

No. 945-946 & 989

FORD MOTOR COMPANY,
Petitioner,

vs.

THE GORDON FORM LATHE COMPANY,
Respondent.

Transcript of Record

On Petition for Writ of Certiorari to the United States Circuit Court of Appeals for the Sixth Circuit

VOLUME I.

Trial Papers, Plaintiff's Record and Part of Defendant's Record.

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No. .....

United States Circuit Court of Appeals

FOR THE SIXTH CIRCUIT.

THE GORDON FORM LATHE COMPANY,
Plaintiff-Appellant and Cross-Appellee,

vs.

FORD MOTOR COMPANY,
Defendant-Appellee and Cross-Appellant.

EQUITY No. 4564.

APPEAL FROM
THE DISTRICT COURT OF THE UNITED STATES,
EASTERN DISTRICT OF MICHIGAN,
SOUTHERN DIVISION.

TRANSCRIPT OF RECORD.

VOLUME I.

Trial Papers, Plaintiff's Record and Part of Defendant's Record.

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EASTERN DISTRICT OF MICHIGAN,
SOUTHERN DIVISION, SS.

Record of proceedings of the District Court of the United States within and for the Southern Division of the Eastern District of Michigan in the cause and matter hereinafter stated. Said action was commenced on the 6th day of July, 1937, and proceeded to final disposition on the 29th day of April, 1941, and during the progress thereof pleadings and papers were filed and orders of the Court made and entered in the order and on the dates hereinafter stated, to-wit:

Present: THE HONORABLE ARTHUR J. TUTTLE,
United States District Judge.

THE GORDON FORM LATHE COMPANY
vs.
FORD MOTOR COMPANY.
} IN EQUITY No. 4564.

DECREE ON MANDATE.

(Entered June 28, 1937 by Arthur J. Tuttle, Judge.)

This cause having been heard by this Court, and upon consideration thereof and upon arguments and briefs of counsel, and interlocutory decree of this Court entered thereon on the 20th day of November, 1934, and appeal of defendant and cross-appeal of plaintiff having been allowed to the Circuit Court of Appeals for the Sixth Circuit from said decree, and such appeals having been heard and disposed of, and said Circuit Court of Appeals having ordered and decreed that the said decree of this Court in this cause be modified and the cause remanded for further proceedings in conformity with the opinion of the Circuit Court of Appeals given January 12, 1937 and the further opinion and ruling of said Court given and entered June 4, 1937, and the mandate of said Court, issued February 19, 1937, having been recalled and amended, and this cause having been remanded to this Court on said amended mandate, now in pursuance thereof, it is

ORDERED, ADJUDGED and DECREED

(1) That the interlocutory decree of this Court entered on the 20th day of November, 1934, be and the same is hereby vacated in favor of this decree which is substituted and entered in place thereof.

(2) That Letters Patent of the United States to Charles Gordon and Alfred W. Redlin No. 1,542,803, issued June 16, 1925 for Lathe is good and valid in law as to Claims 1, 2, 28, 29, 30, 33, 34, 39, 40, 41 and 42; that the inventors, Charles Gordon and Alfred W. Redlin, named in the patent, were the first, true, original and joint inventors of the inventions, improvements and combinations described therein; and that the plaintiff, The Gordon Form Lathe Company, is the lawful owner of the entire right, title and interest in and to said inventions, improvements and combinations and in and to said Letters Patent therefor, as aforesaid, and has full standing in equity with respect to the issues involved in this suit.

(3) That defendant, Ford Motor Company, has infringed the United States Letters Patent No. 1,542,803 to Gordon and Redlin and Claims 1, 2, 28, 29, 30, 33, 34, 39, 40, 41 and 42 thereof and has violated the exclusive rights

of the plaintiff thereunder by the use of machines known in this record as the Melling or Walcott machine and illustrated in Exhibit 21 (drawings of the Melling machine marked B-1, B-2, B-3 and B-4).

(4) That defendant, Ford Motor Company, has not infringed the United States Letters Patent No. 1,542,803 to Gordon and Redlin and claims 29 and 30 of said Gordon and Redlin patent by the manufacture and use of machines known as the Pioch machine illustrated in Plaintiff's Exhibits 23, 24, 25, 44 and 114.

(5) That a Writ of Injunction issue out of and under the seal of this Court directed to the said defendant, Ford Motor Company, its officers, agents, attorneys, employees, associates and privies enjoining and restraining it and them and each of them, from directly or indirectly infringing any of the claims 1, 2, 28, 29, 30, 33, 34, 39, 40, 41 and 42 of said Letters Patent and particularly from making or selling or using any machines like those illustrated in Exhibit 21 (drawings of the Melling machine marked B-1, B-2, B-3 and B-4), or any apparatus or devices covered by or containing or embodying any of the inventions defined in any of said claims, and from offering or advertising so to do, and from aiding or abetting others or in any way contributing to the infringement of any of said Claims 1, 2, 28, 29, 30, 33, 34, 39, 40, 41 and 42 of said Letters Patent.

(6) That the plaintiff recover from the defendant, Ford Motor Company, the damages which plaintiff has sustained and the profits, gains and advantages which the defendant has derived, received, earned or saved by reason of defendant's infringements of said Letters Patent No. 1,542,803, and this cause is hereby referred to Donald L. Quaife, Esq., as Special Master, to take and report an account of such profits, gains and advantages of the defendant, and the damages sustained by the plaintiff by reason of said infringements, and to compute and report a reasonable royalty for the use of said machines and to take evidence and report, on the questions of increase of damages, and that the defendant, its officers, agents, clerks and employees are required to attend before said Master from time to time as he shall direct and produce before him all of its books, papers, vouchers, documents and de-

vices as the Master shall order produced, and to submit to such oral examination as he may direct.

(7) That the bill of complaint is dismissed without prejudice as to claims 12, 23, 24 and 38.

(8) That costs not having been awarded upon appeal from the interlocutory decree, no costs on said appeal shall be taxed herein.

(9) Neither party is awarded any costs in this Court prior to the date hereof.

TUTTLE, *J.* (sgd)
United States District Judge.

Detroit, Michigan,
June 28, 1937.

Approved as to form:

SWAN, FRYE & HARDESTY,
Solicitors for Plaintiff.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Solicitors for Defendant.

REPORT OF SPECIAL MASTER.

(Filed March 3, 1941.)

To the Honorable Arthur J. Tuttle, District Judge:

This case was referred to me as Special Master to take and report an account of the profits, gains, and advantages of the defendant and the damages sustained by plaintiff by reason of the infringement by defendant of plaintiff's patent, Number 1,542,803, issued June 16, 1925, upon a machine for turning non-geometrical forms, and to determine also a reasonable royalty for the use of plaintiff's patent and the question of whether the damages sustained by plaintiff should be increased. Pursuant to the order of reference, I obtained from defendant elaborate state-

ments of account, covering facts underlying the determination of profits and damages and a statement of profit and loss in debtor-creditor form, which were largely prepared by independent accountants retained by defendant. The plaintiff also employed an independent firm of accountants to prepare statements of profits of the defendant from infringement, which were duly filed. A great deal of evidence, including testimony covering approximately 3,500 pages of transcript and hundreds of exhibits, was introduced; and exhaustive briefs covering the legal and factual issues in the accounting were filed by both parties. I have carefully studied all of these documents, as well as the record of the trial before the Court preceding the interlocutory decree on the question of the validity and infringement of the Gordon patent, the opinions of the various tribunals which have passed upon the said patent, and the many reported decisions of the federal courts relevant to the legal issues in the accounting; and I report to the Court herewith my findings of fact and conclusions of law resulting from this investigation. Because of the difficulties encountered in this case, and in order to comply with the standards for a master's report in a patent accounting case set forth in *Horvath v. McCord,* 100 F. (2d) 326 (C. C. A. 6, 1938), I am putting this report in opinion form, with the intention that it shall serve as findings of fact and conclusions of law.

I. NATURE OF INVENTION AND HISTORY OF LITIGATION AND OF DEFENDANT'S USE OF MACHINERY.

The infringement of the defendant consisted in the use of certain cam-cutting machines (referred to hereinafter as the "Walcott" or "Melling" machines) designed by one Melling and constructed and sold by the Walcott Machine Company, of Jackson, Michigan. The controversy over the Gordon and Melling machines has had an extended history of litigation, including interference proceedings in the patent office appealed to the highest tribunal (*Melling v. Gordon,* 4 F. (2d) 945, C. A. D. C., 1925); a proceeding under Sec. 4915 R. S. by Melling to compel the issuance of a patent (*Melling v. Gordon Form Lathe Co.,* 14 F. (2d) 437, D. C., Ohio, 1926); a suit for patent in-

fringement by the present plaintiff against the Walcott Company (*Gordon Form Lathe Co. v. Walcott Machine Co.*, 20 F. (2d) 673, D. C., Mich., 1927, same case on appeal, 32 F. (2d) 55, 1929); and, finally, the present suit, the opinion of the Circuit Court of Appeals being found at 87 F. (2d) 390 (1937). In all of this litigation Gordon was successful on the question of validity and infringement, with the exception of the decision by Judge Simons of this district reported at 20 F. (2d) 673 (1927), in which the Gordon patent was held valid but the Melling machine non-infringing. The Circuit Court of Appeals in both of the decisions held the Gordon patent to be a pioneer patent. Reference is made to the cited opinions for a fuller understanding of the history of litigation over these machines, and for a complete description of the Gordon invention and the mode of operation of the Gordon and Walcott machines, all of which it is unnecessary to repeat in detail here. However, a brief statement of the nature of the patent in litigation and the history of the defendant's use is advisable at the outset.

Plaintiff's patent is one upon a lathe to turn non-geometrical forms, as applied to this case specifically, the pear-shaped cams on an automobile camshaft. The germ of the Gordon invention, as found by the Circuit Court of Appeals, is the oscillation or tilting of the tool under the control of a master cam to maintain at all times a proper cutting angle between the upper surface of the cutting tool and the surface of the work cam. The function of a camshaft in an automobile is to regulate the opening and closing of the valves which admit the combustible mixture into the cylinder and permit it to be expelled after combustion. There are, therefore, two cams, inlet and outlet, for each cylinder. In order to secure proper timing in the engine, it is necessary to machine the camshaft with great accuracy, both cams and bearings generally being machined to a finish tolerance of 2/1000 of an inch. The method of manufacture of a camshaft during and prior to the period of infringement was to forge a steel shaft of the same general shape as the finished shaft but with as much as one fourth inch of excess metal upon it, and to reduce it to finished form and composition in approximately fifty different operations upon

it. In the sequence of operations, the shaft is centered; the concentric bearings and the parts between the cams are turned; and the surplus metal is removed from the cams in two steps: (1) a rough machining operation, which removed most of the metal, and which was the operation performed by the machines in litigation; and (2) a finish grinding of the shaft. In between these two operations, the shaft is casehardened to make its surface wear-resistant. After these and other operations to finish the flanges and bearings, and to put on the necessary screw threads and dowel holes, the shaft is polished and is ready for inspection.

The removal of the excess metal from the cams of a camshaft has always involved difficulty because of their irregular shape. Until the development of the machines in litigation, it was generally thought not to be feasible to use a lathe, such as was used on the cylindrical parts of the shaft, because of the poor cutting angle of the tool traveling around the nose of the cam and the sharp clearance angle required; and only one instance of the use of this type of machine (the so-called Westinghouse lathe) prior to the plaintiff's patent is known. The method in most general use before 1920 was that of grinding—a slow and expensive operation in which the metal was ground off each cam individually with an emery wheel. There were isolated uses of other machines, notably by the defendant, which had not used the grinder (except for its tractor shaft) since early in the century. Prior to 1913, the defendant was using a form miller, which rough machined the cams in three operations, but in that year it adopted for its automobile production a special production machine, designed by its engineers and built to order, known as the Ford cam shaper. In this machine (which is classified as a planer), the camshaft was mounted upon a ram and reciprocated longitudinally beneath eight cutting tools, one for each cam, which were relieved individually under the control of master cams to secure the desired shape of the work. The tools cut in only one direction, and on the return stroke (which was twice as rapid as the forward stroke) the tools were retracted in a body and the shaft rotated a small distance in preparation for the next cutting stroke, approximately ninety strokes being required to cut entirely around the cams. A second revolution of the shaft was made for a

finishing cut, the tools not being advanced but the natural spring back of the shaft permitting the removal of a slight additional amount of metal.

The commercial use of the Gordon machines was limited, less than thirty being sold and their manufacture discontinued some time before the issuance of its patent, due to the successful competition of the Walcott machines, which were better adapted to machine the type of cams in use in the automotive industry. In 1923, defendant purchased on approval a Gordon lathe for use on its tractor shaft, but found that the rapid angular swing in the tool cutting around the point of the sharp-nosed cam used in the Ford shaft during a small angular rotation of the workpiece caused the tool frequently to depart from its proper path, resulting in a nick on the leading side of the nose of the cam, which made it necessary to scrap the shaft. The machine was consequently rejected by defendant. The Walcott lathe (which was designed by Melling after witnessing the operation of a Gordon machine on a Ford tractor camshaft) avoided this difficulty by pivoting the tool upon a center remote from the cutting point, which caused the tool to cut slowly around the point of the cam with a relatively small change in its angular position. (This departure from the Gordon machine, which pivoted the tool around its cutting point, was held by the Court of Appeals to be insufficiently substantial to negative infringement.) Accordingly, in 1924, defendant purchased a battery of eighteen Walcott machines for its entire production of camshafts (two for the tractor and sixteen for the automobile shaft). It continued to use them (with the addition of six more in 1929) until 1931, when they were finally replaced by milling machines which were designed by defendant's engineer Pioch to avoid the effect of the decision of the Court of Appeals in 1929 that the Walcott machines were infringing, and which in this case were ultimately held noninfringing. To bring this recital down to date, it should be stated that in 1935 the defendant eliminated the operation for which the machines in litigation were used by substituting cast alloy shafts, cast with such accuracy that a roughing operation preceding the finish grinding of the cams became unnecessary. It appears, however, that except for Ford, the Walcott machines are still in general use in the industry for rough-machining camshafts.

II. CLAIMS OF PARTIES.

Despite the thoroughness with which every avenue of this case has been explored in the hearings, the parties are very far apart on the ultimate question of defendant's liability and on practically every issue in the accounting. The plaintiff claims that the profits, savings, gains, and advantages of the defendant from infringement, computed on a conservative basis, amounted to a minimum of $957,340.36; and that the damages suffered by plaintiff, on the basis of a reasonable royalty of six cents per camshaft turned on the infringing machines, amounted to $475,095.74. Plaintiff also claims that the reasonable royalty should be tripled for willful infringement, at least for the period subsequent to the decision of the Circuit Court of Appeals in *Gordon v. Walcott* in 1929. On the other hand, the defendant claims that it realized no savings, but rather lost money, from the use of the infringing machines; that the plaintiff suffered no damage from the infringement; that its infringement was not willful and plaintiff is not entitled to increased damages, if any be found to exist; that, if defendant realized any profits or savings, they are attributable not to the Gordon invention but rather to patented improvements incorporated in the Walcott machine; and, finally, that in any event the plaintiff is entitled to neither damages nor profits for the period prior to notice of infringement on June 13, 1929. Defendant further charges that the plaintiff is guilty of unclean hands, which should bar it from any relief.

Before considering specifically the issue in this accounting, it may be advisable to make some general comments upon the claims made by the parties. With regard to defendant's claim of loss, while it is conceivable that it made a mistake in adopting the Walcott machines and that it did not notice the slight loss per cam claimed it, especially since it was attributable to the addition of another operation, still such a condition would be the exceptional thing, and the contention should be scrutinized closely before being accepted. A claim of loss by the infringer appears to be quite common in patent accounting cases. While it is true that in many cases the claim has been sustained, the courts have always regarded it with some suspicion. (See remarks in *Carson v. American Smelting Co.*, 25 F. (2d)

116, 121, D. C. Wash., 1928; *Haiss Mfg. Co. v. Link Belt Co.*, 50 F. (2d) 450, D. C. Pa., 1931, affirmed 63 F. (2d) 479; *Emigh v. B. & O. R. Co.*, 6 Fed. 283, C. C. Md., 1881.) While the claim is here certified to by independent accountants, such also was the case in *Larson v. Wrigley*, 20 F. (2d) 830, and 277 U. S. 97, 72 L. Ed. 800 (1928), where profits of approximately $1,000,000 were found to exist.

Defendant's claim should be considered further in the light of its experience with the Walcott machines. Defendant first ordered two Walcotts in January, 1924, after an investigation by its purchasing department. After trying them out, it ordered sixteen more in April, receiving the last one in June; and it cancelled orders for five new shapers under construction, at a cost of $20,000. The Model T machines were first installed at its Highland Park plant, and a study of their operation was made by the purchasing department from August 11 to November 1, the conclusion being reached that they were only sixty per cent efficient. Nevertheless, no attempt was made to recover from the Walcott Company on its guarantee of production, which defendant had insisted upon; but instead the defendant moved the machines to the Rouge plant, to which its main productive activities were being transferred, making some changes in the machines, particularly the slides. Before moving them, it set up the shapers at the Rouge plant, but again replaced them with the Walcotts. Within the next two years, it had scrapped all of the shapers. In 1929, defendant purchased six more Walcotts, and neither then nor later in the year when it was searching for a non-infringing substitute did it consider returning to them.

It may also be noted that there was some change between the infringement and accounting stages of this case in the attitude of defendant's employees toward the Walcott lathes. While during the main trial they were regarded as excellent machines, there was some tendency to disparage them on the accounting as being overly complicated and troublesome. Of course, as in practically all patent accountings, most of the evidence here has had to come from defendant; and this should be considered in weighing the evidence, since the testimony of some (though by no means all) of its witnesses was understandably affected by the self-interest of their employer.

I have the feeling, on the other side, that plaintiff, as well as defendant, has taken a somewhat extreme position in this case. There is a tendency on its part to measure the benefits of the Walcott machines to Ford largely by reference to the grinding process, overlooking the fact that Ford had had a machine much superior to that in use by the rest of the industry. There was some difference of position on the part of plaintiff upon similar issues: for example, it has minimized the differences between the Gordon and Walcott machines, while at the same time claiming that a relatively slight change in the Westinghouse machine by defendant entirely changed its principle of operation.

Of course, an accounting of this sort is necessarily of a speculative nature and offers room for considerable difference of opinion. Difficulties are inherent in an attempt to compute profits from the use of a machine producing one out of several thousand parts in an automobile, and even under ideal conditions a large element of guesswork is inevitable in the conclusions adopted.

III. ACCOUNTING PERIOD, AND PRODUCTION OF SHAFTS ON INFRINGING MACHINES: QUESTION OF NOTICE.

The first problem is to define the scope of defendant's infringement, both in duration and in the number of separate accounts of infringement. The infringement period cannot begin before June 16, 1925, when the plaintiff obtained its patent and on which date the infringing machines had been used by defendant for more than a year. The period ends on March 16, 1931, when the Walcott lathes were finally replaced with the non-infringing Pioch machines.

A. BEGINNING OF PERIOD.

Defendant claims, however, that its infringement can not have commenced until June 13, 1929, when actual notice of the claim of infringement was received. In the main trial of this case, there was sharp dispute on this question, the plaintiff claiming that it mailed a notice of infringement to defendant in 1925; while defendant denied receiving the purported notice and also claimed that it was couched in such vague language as not to constitute a notice

of infringement, even if received. Your honor held that the sending of the 1925 notice to plaintiff had not been sufficiently proved, and provided in the interlocutory decree that the accounting period would commence on June 13, 1929. The Court of Appeals, however, ordered this provision stricken and the whole question reserved for the accounting, the court saying:

> "Concerning the cross appeal which challenges paragraphs 5 and 6 of the decree, it is our view, upon the authority of *Wine Railway Appliance Co. v. Enterprise Railway Equipment Co.*, 297 U. S. 387, 56 S. Ct. 528, 80 L. Ed. 736, and because of the apparent incompleteness of the record upon the issues involved, that all questions relating to the accounting should be postponed until after the return of the master's report." 87 F. (2d) 393.

In the accounting proceeding, the plaintiff submitted no additional evidence on the question of notice, relying upon the legal contention that actual notice is not a condition to its right to recover. After examination of the record, I see no reason to take a different view of the evidence than that of the District Court; and, insofar as the question is before me, I find that plaintiff first actually notified defendant of the infringement on June 13, 1929. Since the matter of giving notice is within the control of the plaintiff and a notice can easily be given in such manner that it can be proved, it is fair to require of plaintiff a fairly high standard of proof on this question.

The record further shows that the plaintiff had discontinued the manufacture of its patented machines some time before the issuance of its patent, and it neither manufactured nor sold machines after that date. All of the machines manufactured and sold theretofore, including the one sold to defendant, were marked with a notice of the pending patent application.

The question is now encountered of whether the plaintiff can recover prior to June 13, 1929, in the face of the provision of the Patent Statutes, 35 U. S. C. A. Sec. 49, requiring a patented article to give public notice that it is patented by marking it as such, and permitting him in default thereof to recover for infringement only upon proof of actual notice to defendant of infringement and con-

tinuance of the infringement after such notice. The decision of the Supreme Court in *Wine v. Enterprise, supra* (decided subsequent to the decree of the District Court in this case), is controlling on this issue. In that case, the court held that a non-manufacturing patentee, who was unable to mark his products, is not required to give actual notice to an infringer as a condition to recovery. The purpose of the statute, according to the court, is to require marking of patented articles and to prescribe a penalty for non-compliance; but it does not apply to non-producing patentees, because penalty for failure implies an opportunity to perform. The opposite rule would make it impossible for a patentee to recover against a secret infringer, a result Congress could not have intended.

Defendant claims *Wine v. Enterprise* does not apply to the case at bar because plaintiff here manufactured its machines prior to the issuance of his patent and hence is not a non-producing patentee. However, plaintiff did not manufacture subsequent to his patent, and obviously could no more mark its machines as patented than the plaintiff in the *Wine* case. The case of *Hazeltine v. Radio Corp.*, 20 Fed. Supp. 668 (D. C., N. Y., 1937) cited by plaintiff, differs from the present one, because there the plaintiff's licensees failed to mark the patent articles manufactured by them, and it was held that under the statute the plaintiff was in the same position as if it had manufactured itself.

Defendant further contends that the principle of *Wine v. Enterprise* does not apply to this case, because plaintiff here was not in the position of a patent owner "guilty of no neglect" but rather had full knowledge of defendant's use from the beginning, and a secret infringement is not therefore involved. However, neither the statute nor the court's interpretation of it makes the knowledge of either party of the infringement of any importance—in fact, it does not appear whether the patentee in the *Wine* case had such knowledge. The court states (p. 395) that obviously, except for the statute, a patentee might recover all damages without giving prior actual notice to the infringer; and then holds that the statute does not apply to a non-producing patentee. Perhaps, it would be most just to require a patentee having knowledge of an infringement to notify the infringer as a condition to recovery, although the argument in favor of such requirement would equally

apply whether the patentee had marked his articles with public notice or not. At any rate, the statute does not now require such notice; and defendant's appeal must be to Congress to amend the act.

It is finally contended that even if the act itself did not require plaintiff to notify defendant as a condition to recovery, still, under the authority of *Horvath v. McCord,* 100 F. (2d) 326 (C. C. A. 6, 1938), the plaintiff is precluded by the form of its pleadings from taking advantage of that fact. In that case, the court held that the intervening plaintiff-licensee, having alleged in its complaint actual notice, which was not proved, and not having claimed in its pleadings *in rem* notice to the public, could not rely upon *in rem* notice on the trial. (It appears that the intervening plaintiff had built three machines without the statutory markings, and that the court held, as an additional ground for its decision, that it had not shown compliance with the provisions of the statute.) I do not think, however, that the *Horvath* case bars the plaintiff here from recovering for infringement prior to June 13, 1929. The plaintiff in its complaint alleges the issue of its patent on June 16, 1925, and (in paragraph 8, which alleges actual notice) states that it "* * * has neither made nor sold the patented machine since the issue of the patent in suit." This would seem sufficiently to set forth the facts underlying plaintiff's claim of *in rem* notice: the only thing more it could have done would have been to have alleged specifically that defendant had constructive notice of the patent, which is in the nature of a legal conclusion. In order to have claimed *in rem* notice, it would have been necessary for the intervening plaintiff in the *Horvath* case, being a manufacturing licensee, to have made additional allegations that it had marked its machines with the statutory notice. Here, no additional allegations are necessary to raise the issue.

I therefore conclude that, under the statute, plaintiff can recover full profits and damages from defendant from the date of issue of its patent, without giving defendant actual notice. Of course, a patentee who sits idly by while an infringer builds up a business without protest may be barred from all recovery on the ground of laches. *Dwight & Lloyd Sintering Co. v. Greenwalt,* 27 F. (2d) 823, 827 (C. C. A. 2, 1928). However, no defense of laches as such

is made here; and there is no such neglect by plaintiff of its patent rights here as in those cases (see discussion of "Unclean Hands," *infra*).

B. PRODUCTION OF CAMSHAFTS AND END OF ACCOUNTING PERIOD.

The defendant used the Walcott lathes to machine three different types of camshafts: that for the Model T car from 1924 to 1929; the Model A car from 1927 to 1931; and the Model F tractor from 1924 to 1928. Actual production records are available for most of the months of infringement and for all of the months of Model A production. For nineteen months of Model T production and seventeen months of tractor production, actual production records were not kept; and the production during those months has been estimated by the defendant by adding motor production and camshaft service sales. This method is not one hundred per cent accurate because it does not take inventories into consideration, defendant's inventory records for the period having been destroyed. In fact, records of tractor camshaft production for certain months found during the trial showed a higher production than had been estimated. However, it has been the practice of defendant to have only a few days elapse between the delivery of raw materials to its plant and the production of the completed car, and to keep only a small and fairly constant inventory of parts on hand. Such errors as may result from variance between camshaft motor production plus service sales, and actual production, in a given month should not be great, and should tend to cancel out over a period of months. In the case of tractor shafts, the estimated method may result in an understatement of shafts during the later months of production, because of the probability that an inventory of camshafts was built up for the purpose of servicing tractors after the discontinuance of production; but no basis for estimating such production exists on this record.

A more serious difficulty is encountered in determining the production of Model A shafts on the Walcott lathes from May 13, 1930, when the first Pioch machine was installed, until the end of the accounting period, during which time the two types of machines were used simul-

taneously. The testimony indicates that as each Pioch machine was installed it was placed in immediate production and continuously so used. Finally, after all six Piochs had been installed, the overhead oscillating cams were removed from the Walcotts and their use for machining cams discontinued. While defendant has assigned February 4, 1931, as the terminal date for Walcott production, it is reasonably clear from the evidence that the date of discontinuance was March 16, 1931, which is in accordance with Pioch's own affidavit. The records show that all the Walcotts remained available until February 5, 1931, when eight were removed from the department, but that seven were not removed until March 16. The last Pioch machine was installed on February 3. It seems natural that defendant would run the Piochs a few weeks to see if they would turn out the production satisfactorily before discarding the Walcotts; and this conclusion fits in with Meyers' recollection (D. A. R. 444) to the effect that some Walcotts were moved out before the removal of the overhead mechanism.

Defendant kept no records showing actual production of camshafts upon each type of machine during the period of concurrent use. Defendant prorates the production for that period as follows: Pioch production is estimated by multiplying the number of hours of production in the department by the production per hour on the Pioch machines (at the rate of 42 shafts per machine, the figure shown on a time study in July, 1931); and the remaining production is assigned to the Walcotts. While defendant's method of proration attributes much the largest part of the production during the period to the Walcotts, plaintiff claims it overstates production on the Piochs, because the rate of production at the outset when the machines were new was probably considerably less than in July, 1931, and since the lunch period (of approximately twenty minutes per shift on three-shift days) was disregarded in computing production hours. Defendant's proration also assumes that all Pioch machines were working full time, without allowance for repairs beyond that provided in the time study. (On the other hand, there was considerable testimony that the Piochs averaged 55 shafts per hour in operation instead of 42; and during the months when only one was available,

the rate of production would tend to be higher than when one man operated two machines.)

Plaintiff claims that because of defendant's failure to keep separate records of Pioch production, all production during the period must be assumed to have been made on the Walcott machines. Support for this position is found in *Producers' & Refiners' Corp. v. Lehmann,* 18 F. (2d) 492, 498 (C. C. A. 8, 1927), where the records of defendant failed to separate the oil made and sold by it which was treated with the infringing process from that which was not so treated, and the court held that plaintiff was entitled to recover profits on all the oil. However, it seems clear that there was a considerable production upon the Pioch during the period. Making due allowance for the factors pointed out by plaintiff and resolving every reasonable doubt against defendant, it still seems probable that an average of at least 30 shafts per hour (including the lunch period) were produced on the Pioch machines, and I have therefore prorated the production on that basis. Schedule A, attached to this report, shows the yearly production of shafts of the three types; Schedule B is a computation apportioning Pioch and Walcott production according to the method adopted here. The resultant total production of camshafts during the accounting period is as follows: Model T, 3,420,166; Model A, 4,306,504; Tractor, 275,664.

IV. PROFITS.

Under the law, defendant is obliged to account to plaintiff for all profits, gains, and advantages realized from infringement, the defendant being treated in this respect as a trustee *ex maleficio* of the profits derived from its wrongful act of appropriating another's property. (See *Computing Scale Co. v. Toledo Co.,* 279 Fed. 648, C. C. A. 7, 1921.) In determining these profits, the inquiry is directed to two main questions: First, what profits, if any, were realized from the use of the infringing machines? Second, what part of the profits so realized is legally attributable to the plaintiff's patented invention, and what part, if any, is attributable to other elements incorporated in the infringing machines. In general, the burden of proof on both of these issues rests upon the plaintiff, although under certain circumstances it may shift to the defendant.

A. PROFITS FROM INFRINGEMENT.

1. Standard of Comparison.

In cases of this kind, where the infringement consisted in the use of a patented machine or process, rather than the manufacture and sale of a patented thing, defendant's profits are measured by the savings accruing to it from the use of the infringing machine or process as compared with what it would have cost with the best alternative machine or process available to accomplish the same result. The issue in such cases was stated in *Mowry v. Whitney,* 81 U. S. 620, 650, 20 L. Ed. 860 (1872), as follows:

> "What advantage did the defendant derive from using the complainant's invention over what he had in using other processes then open to the public, and adequate to enable him to obtain an equally beneficial result? The fruits of that advantage are his profits."

The principle was recently stated in similar language by our Circuit Court of Appeals in *Horvath v. McCord, supra* (p. 330). It seems obvious that, other things being equal, the real benefit to a party from using a patented contrivance is the saving in cost of such use as compared with the cost of what he would otherwise have been obliged to resort to. Further decisions of the Supreme Court affirming this principle are as follows: *Littlefield v. Perry,* 88 U. S. 205, 22 L. Ed. 577 (1875); *Mevs v. Conover,* 23 L. Ed. 1008 (1877); *Black v. Thorne,* 111 U. S. 122, 28 L. Ed. 372 (1884); *Cawood Patent Case,* 94 U. S. 695, 24 L. Ed. 238 (1877); *Tilghman v. Proctor,* 125 U. S. 136, 31 L. Ed. 664 (1888); *Sessions v. Romadka,* 145 U. S. 29, 36 L. Ed. 609 (1892).

The savings or advantages from infringement found by this method bear no necessary relation to the profit derived from the defendant's general business. The cases hold that even though he realized large profits from his business as a whole, if he could have accomplished the same result by another method no more expensive than the infringing one, he is chargeable with no profits; while, conversely, defendant must account for the savings from the use of the patented invention even though its business as a whole was conducted at a loss, or even though the infringing operation itself was a useless or non-profitable one. (See *Cawood Patent Case, supra.*)

In applying the rule for determining profits from use, the first problem is the determination of the proper standard of comparison, or the alternative machine or process by reference to which savings are to be judged. The differences in the conclusions of the parties as to the profits of defendant here is largely attributable to a difference in choice of the standard of comparison. Consequently, the issue is probably the most important one in the case.

Certain rules as to what is required for a good standard of comparison have been laid down by the courts. The standard selected must have been available to the defendant at the time of infringement and capable of producing an equally beneficial result. *Black v. Thorne,* 111 U. S. 122, 28 L. Ed. 372 (1884); *Producers' & Refiners' Corp. v. Lehmann, supra*; *Cambria Iron Co. v. Carnegie Steel Co.,* 224 Fed. 947 (C. C. A. 3, 1915); *LaCross Plow Co. v. Van Brunt,* 220 Fed. 626 (C. C. A. 7, 1915). If the result cannot be obtained in any other way than the patented method, the patentee is entitled to all the profits derived by defendant from the sale of the thing made by the infringement. *Western Glass Co. v. Schmertz Wire Glass Co.,* 226 Fed. 730 (C. C. A. 7, 1915); *Novelty Glass Co. v. Brookfield,* 170 Fed. 946 (C. C. A. 3, 1909). (However, see *Pressed Prism Glass Co. v. Continuous Glass Prism Co.,* 181 Fed. 151, C. C., Pa., 1910, where in such a situation the court computed the difference in the value of the product obtained by the infringing and the alternative processes.)

A machine developed after infringement cannot be used as a standard of comparison. *Novelty Glass Co. v. Brookfield, supra*; *Union Electric Welding Co. v. Curry,* 279 Fed. 465 (C. C. A. 6, 1922); *Knox v. Great Western Silver Mining Co.,* Fed. Cas. No. 7907. Whether the machine proposed as a standard must have been in existence prior to the time of infringement is a disputed question, which will be considered hereafter.

The standard of comparison must be the least costly of the alternative machines available, and where plaintiff has failed to select the best standard and there was no evidence in the record from which costs can be computed upon it, the award of profits has been denied. *Empire v. DeLaski,* 281 Fed. 1 (C. C. A. 2, 1922); *Dunkley Co. v. Central California Canneries,* 7 F. (2d) 972 (C. C. A. 9, 1925). The

presentation by defendant, however, of several alternative standards of comparison, where the costs have been computed upon each to show a loss has been approved by the courts. *Carson v. American Smelting Co., supra.*

Although it appears most usual for the standard of comparison to be the machine or process actually used by defendant for the purpose prior to infringement, this is not required, as the cases hold that the defendant can take advantage of another machine which could have been used at less cost. *Tilghman v. Proctor, supra*; *Locomotive Safety Truck Co. v. P. R. Co.*, 2 Fed. 677 (1880).

Obviously, it is often difficult to decide what machine should be adopted as the standard of comparison; and the question has resulted in a sharp dispute here. There is no dispute about the proper standard for Model T production: the Ford shaper was used to machine the Model T shaft over a ten-year period preceding the infringement; it produced a result substantially equivalent to that produced by the Walcott lathes; and from cost standpoint, it was evidently at least as good as any of the other non-infringing machines available at the time and much superior to the grinder. It is agreed that the Ford shaper is the correct standard for the Model T. The difficulty arises with the Model A and tractor camshafts, because of the fact that, in order to obtain improved engine performance, the diameter of the bearings was made considerably greater than that of the cams. As a result the shaper in its original form could not have been used to machine these shafts, because of interference between the center and one of the end bearings and the apposite cutting tools of the shaper. Defendant's witness Herklotz testified on the main trial that the Ford cam shaper could not have been used on the Model A or tractor shafts. Plaintiff accordingly claims that the shaper was not available for the production of these shafts, and adopts the grinder as the standard upon which its accounts are based.

While it is clear that the grinder was an available method of machining the Model A and tractor camshafts, defendant attacks it on the ground that much less expensive machines, including the shaper, were available to it for that purpose. It is claimed that the shaper could have been used by making alterations in its design or in the design of the

camshaft, obvious to any skilled mechanic and resulting in an equally good product; and several methods of accomplishing this have been presented. In addition, defendant proposes three other machines as standards of comparison, the use of any one of which, it is claimed, would have been less expensive than the grinder, as follows:

1. The Westinghouse lathe (a machine which was the subject of considerable discussion in the main trial of the case).

2. The modified Walcott machine with a non-tilting tool, for Model A production.

3. The Pioch machine, for Model A production subsequent to May 13, 1930.

In view of the fact that the problem for tractor production is different from that of Model A and some of the proposed standards do not apply to the former, I will consider first the question of the proper standard for the Model A shaft.

a. Standard for Model A Shaft.

(1) Pioch and Modified Walcott Machines.

The last two machines suggested can be considered first, since I am of the opinion that neither is an acceptable standard of comparison. The modified Walcott machine is embodied in a patent issued July 5, 1927 (prior to the commencement of Model A production), and differs from the original in that the tool is fixed in a vertical bar which is attached at the end to two parallel arms (one of which contacts the master overhead cam), with the result that the entire tool moves up and down in a parallel position instead of pivoting upon an axis. Although a constant angle between tool and work is not obtained with the parallel type head, the variation is not great enough to result in inefficient cutting. The Walcott Company began to manufacture machines of this type in 1929 to avoid the effect of the decree of infringement against it, and according to testimony of its engineer, no decrease in speed or increase in selling or maintenance costs resulted. The development of the Pioch machine has been previously outlined. The first one was placed on the production line on May 13, 1930, and five more added between December, 1930,

and February 4, 1931; and they proved to be much faster than the Walcotts. Defendant claims that by comparison with the modified Walcott lathe after July 5, 1927, or the Pioch after May 13, 1930, it realized no profits from its infringement.

Plaintiff claims that neither of these machines can be used as a standard of comparison because they were not in existence at the commencement of the infringement, but were designed during infringement to avoid its effects. Defendant contends that the law does not make such a requirement, and that, in any event, the modified Walcott lathe was available during the entire Model A production, which was a separate infringement from the Model T and tractor production.

The authorities are not entirely clear on the question of when a machine must be developed to be a good standard of comparison. The general rule, as stated above, prohibits the use of a machine developed after infringement. At least one case, following early dicta of the Supreme Court, has held that the standard must have been in existence before the date of issuance of the plaintiff's patent. *Turill v. Illinois Railroad Co.*, 20 Fed. 912 (C. C., Ill., 1880; affirmed 110 U. S. 301, on grounds eliminating this as an issue). Later cases more logically have held the date of invention controlling, on the ground that the infringer could have resorted to any machine developed before infringement, if the necessity had appeared. *American Pneumatic Co. v. Snyder*, 241 Fed. 274 (D. C., N. J., 1917); *Columbia Wire Co. v. Kokomo Co.*, 194 Fed. 108 (C. C. A. 7, 1911). (See also *Philadelphia Rubber Co. v. Reclaiming Works*, 277 Fed. 171, C. C. A. 2, 1921, where the court said, "The field of selection of process which might be used should be, in principle, that which is open to the art at the time the invention is appropriated.")

The courts holding the latter view, however, have split in turn on the question of whether a machine developed during infringement may be used as a standard. In *Expanded Metal Co. v. General Fireproofing Co.*, 247 Fed. 899 (D. C., Ohio, 1917), the court held it could not. (This rule was approved in dicta by the lower court in the *Pennsylvania Rubber* case, *supra*, 276 Fed. 600, and apparently followed in *National Carbon Co. v. Richards*, 85 F. (2d) 490

(C. C. A. 2, 1936), where a machine placed on the market a year before the termination of infringement was rejected as a standard.) On the other hand, in *Minerals Separation v. Butte Mining Co.*, 274 Fed. 878 (D. C., Mont. 1921), the court held that the field of selection of processes was on a day-to-day basis, and that the standard of comparison need not have been in existence at the commencement of infringement. (*Cf. Novelty Glass Co. v. Brookfield, supra,* where plaintiff claimed no profits for the period subsequent to the acquisition of rights to a superior machine.) It would seem that this is the fairer rule (provided allowance is made for the cost of the change-over), since the defendant could shift to an improved machine developed during infringement.

I think, however, that further discussion of this issue would not be profitable, since I feel that both of these proposed standards should be rejected on other grounds. As to the Piochs, the evidence indicates that they were constructed by defendant to replace the Walcotts as rapidly as could practically be done, in order to avoid piling up liability for infringement. A single machine was first constructed for testing purposes, and, as soon as it was found successful, the remaining five were ordered on a rush basis and installed as soon as completed. Consequently, the Pioch machines, from every practical standpoint, were not available until the time they actually replaced the Walcott lathes, and cannot be used as a standard of comparison.

With the modified Walcott lathe, the serious question is whether it avoids infringement of the plaintiff's patent. The essence of the plaintiff's invention has been found by the courts to relate to the tilting or oscillation of the tool to maintain a proper cutting angle. The claims which have been upheld variously describe means for "varying the angular relation of the tool to the work," for "swinging" the tool, and "tilting" it. The tool of the parallel head type Walcott does not tilt or pivot upon an axis. However, it does retain a vertical back and forth movement under control of a cam, in addition to the reciprocating movement, for the same purpose of maintaining a proper cutting angle as with the original. This movement can fairly be described as an oscillatory one; and it can also be considered a swinging one; for while the term "swinging"

ordinarily connotes movement about an axis, it is also defined as "oscillation" or movement "to and fro." (See *Webster's New International Dictionary,* Second Edition.)

While this issue, raised incidentally in the accounting, might well be the subject of a separate lawsuit, it would, in my opinion, be giving undue significance to a seemingly trivial difference between two machines to hold the original Walcott lathe infringing and the modified one not; and I think the adaptation sufficiently comes within the language of the claims of the Gordon patent, reasonably interpreted, to hold that if the original one infringes the modification does also. My conclusion is reinforced by the fact that the same conclusion was reached by defendant's chief tool designer, Pioch, after inspecting the parallel head Walcott in 1929 as a possible method of avoiding infringement and that it was thereafter adopted by defendant. Consequently, this machine is not a good standard of comparison.

(2) Westinghouse Lathe.

The Westinghouse lathe was developed by the Westinghouse Electric & Manufacturing Company about 1909; and was used to machine the cams on some 3,000 camshafts for the Chalmers and Bergdoll automobile engines in 1910 and 1911, and some 40,000 shafts for its own farm lighting outfits (of one and two cylinders) from 1917 to the time of this accounting. Its method of operation is relatively simple, the machine being a lathe, with a master camshaft in the rear, in which each tool is moved straight in and out (to produce the desired shape in the work) under pressure of the master cam contacting a follower bar mounted rigidly on the same shaft as the tool, the shaft being held tightly against the master cam by pressure of a spring. As there is no tilting of the tool, the angle of presentation of the tool to the work varies considerably as it cuts around the nose of the cam, and relatively sharp clearance angles are necessary to give the tool proper clearance. The work cam is substantially a replica of the master, with a slight deviation in contour, due to the use of a slightly blunt-nosed follower and a knife-edged tool, this variation making necessary the use of a developed master cam slightly fatter around the nose than the cam produced by turn-

ing. So far as is known, a machine of this type has never been used outside the Westinghouse plant, although several instances of such use to turn eccentric cylinders are known.

There has been a great deal of debate between expert witnesses throughout this case on the question of the practicability of the Westinghouse lathe for cutting cams. Experts called by plaintiff claim that the machine disregards the fundamental principles of cutting metal by permitting wide variation in the cutting angle of the tool, causing it to scrape the metal off on one side and requiring unduly sharp clearance angles for proper tool support, which difficulties are accentuated with a sharp-pointed cam of the Ford type. It is further claimed that unequal pressure of the followers on the nose of the master cams tends to throw the master and work shafts out of synchronism. Support for these claims is found in the testimony of defendant's witness Oberhoffken, the designer of the Ford cam shaper, who rejected that type of machine in 1913 because of the clearance angles required. On the other hand, other witnesses testified that the Westinghouse is an entirely practicable production machine for cutting cams; and it has been used successfully in the Westinghouse plant for that purpose for many years. While the Court of Appeals in this case stated that "* * * the product of the [Westinghouse] machine was far from perfect and * * * its use was abandoned after cutting a comparatively small number of shafts," the court must have been referring to the 1909 machine, as the 1917 one has never been abandoned.

No evidence was submitted here as to the speed of production attained on the machine in the Westinghouse plant; but for the purpose of showing the production which could have been obtained on the Ford shafts, defendant constructed an attachment based on the Westinghouse blueprints but adapted to machine the Model A camshaft, and mounted it on a standard Reed-Practice lathe dating back to the infringing period. The tools were fabricated from cutting metal of a composition in use at that time. Defendant made two one-hour test runs of Model A shafts on this machine, turning them at a faster rate than that obtained with the Walcotts. On the basis of this evidence, together with expert testimony that the machine could

have been constructed as cheaply as the Walcott and would have been simpler and less expensive to maintain, defendant contends that by reference to the Westinghouse machine it made no profits from its infringement.

In constructing the Ford-Westinghouse attachment, certain departures from the original Westinghouse design were made to adapt it to the Ford shaft and to increase its speed of production. Among the refinements incorporated in the machine for the latter purpose were a quick-acting steady rest, quick-acting tailstock, a rack and pinion mechanism to retract the tools for rapid loading, and a stop mechanism for making a double cut on the cams. All of these devices, it appears, were known to machinists at the time of infringement, although they were rarely, if ever, brought together in one machine. A further change resulted from the use of a production camshaft for the master shaft to save expense, which made it necessary to secure in the work an exact replica of the contour of the master cam. As a knife-edged follower (which would have accomplished this result) would have been impracticable, the design of the tool was modified so that the profile of the cutting edge formed an arc of a radius identical with that of the follower, making the point of contact of tool and work shift in synchronism with the movement of the point of contact of the follower and master cam.

Consideration of this machine as a possible standard of comparison leads to the question of whether it can be used as such in view of the fact which appears from the record that defendant knew nothing of its existence during infringement, even when it was searching for a substitute for the Walcott lathes. In *Reed Roller Bit Co. v. Hughes Tool Co.*, 12 F. (2d) 207 (C. C. A. 5, 1926) (a case of willful infringement), it was held that a device patented prior to infringement but not known to the defendant while infringing could not be a standard of comparison, the court distinguishing the problem before it from that of anticipation of a patent, where lack of knowledge is immaterial. However, the plaintiff has conceded that the Westinghouse machine was available to the defendant.

Plaintiff's chief attack on the Westinghouse lathe as a standard of comparison centers around the changes made in the Ford adaptation. It is contended that it is improper

to present a standard with many changes from the original which increase its speed. More emphasis, however, is placed upon the change which results in a replica of the master cam being formed in the work, which, it is claimed, alters the principle of operation of the machine. Whether this is so, the tool as thus modified has an edge with little support which chips easily, resulting in alteration of the shape of the cam. The only test of a shaft turned on the machine was made by Gordon, who showed that the cams were not properly aligned and the shaft would have to be scrapped. While this may have been due in part to the soft metal of the production camshaft used as the master, it seems clear that the modification which makes the contour of the master and work cams identical results in a machine which is not a practicable production proposition and which would not have been used by defendant in production.

Does the rejection of this change made by defendant as impracticable eliminate the Westinghouse as a standard of comparison? The original machine worked satisfactorily at the Westinghouse plant; and defendant could readily have developed a master shaft which would permit the use of a tool of the original form, except for the steeper clearance angle required. Plaintiff does not claim this would not work, but claims the speed obtained would have been less than with the grinder. Plaintiff claims the Westinghouse blueprints show that in using the machine the company left a large surplus stock on the nose of its cams, which it had to remove by grinding or some other process. While I do not agree with plaintiff's interpretation of the Westinghouse blueprints, I think for another reason the Westinghouse machine must be rejected as a standard: there is not sufficiently reliable evidence of the speeds obtainable with it in actual production. There is virtually no evidence of the speeds on the machine in the Westinghouse plant. It seems clear they must have been very slow, because of the absence of the speed-boosting features added by Ford to the machines. The production problem of manufacturing approximately 2,000 camshafts per year at Westinghouse is quite different from that of turning out the Ford production averaging upwards of a million. As to the demonstration runs on the Ford-Westinghouse ma-

chine, even if the speeds obtained were identical with what would have been secured if the original tool form had been used, still these were in the nature of laboratory tests of the machines, which are not a reliable guide to production obtainable under production conditions. Nearly any machine can be pushed for short periods far beyond the speed at which it is normally run. Therefore, although it is possible that an adapted Westinghouse would have turned out the Ford production in a satisfactory manner faster than the Walcott lathes, I do not think the evidence as to that is clear enough to permit its use as a standard of comparison.

(3) Ford Cam Shaper.

Defendant presents several ways in which the Ford shaper or the camshaft could have been adapted to permit the use of the shaper on the Model A shaft, despite the enlarged bearings, which, it is claimed, is perfectly permissible under the law relating to standards of comparison. The principal methods can be summarized as follows:

1. A machine (designed under the direction of defendant's engineer Pioch) constructed like the original shaper, except that the two interfering tools are mounted in an attachment at the front which is connected with the driving mechanism in such a way that the tools machine the cams by pursuing them at twice their speed and overtaking them on the same stroke on which the other tools cut.

2. A machine which differs from the original shaper chiefly in that every other tool is mounted to cut in the opposite direction of the one next to it. Additional changes make the two strokes of the ram of equal duration; and the tools are individually relieved on the non-cutting stroke, instead of being relieved in a body. (This adaptation was originally designed by Oberhoffken, the designer of the shaper, around 1919 to machine the tractor cams, but was never built because tractor production was too small to warrant the construction of special machinery.)

3. A modification of the shaft, in which the length of the center and end bearings is reduced to provide additional space eliminating tool interference, and in which the diameter of the bearing is either increased or additional ones added to provide as much bearing surface as on the original shafts.

4. A modification of the shaft in which the end bearing is attached after the remainder of the shaft has been machined.

Defendant further contends that even if none of the above methods are considered available during the infringement, the shaper at least could have been used on the Model A shaft in a less efficient way, but still less expensive than the grinder, with no appreciable change in the design, by simply removing four of its tools and using two shapers to machine the shaft, turning the shaft end for end on the second one.

Evidence was submitted by defendant showing that it is routine practice in its plant upon change of car models or of parts to redesign existing production machinery to adapt it to the new parts. A large staff of tool designers is employed by defendant for this purpose and to design new special production machines. Thus, when the change was made from the Model T to the Model A automobile, approximately five hundred production machines were modified. At that time, changes were made in the Walcott lathes, particularly in the form of the overhead cams, to fit them to the Model A camshaft. Similarly, when defendant changed from a four to eight cylinder motor, the Pioch cam millers had to be altered. It also appears to be common for defendant's engineers to alter the design of automobile parts to facilitate production. On the basis of the evidence, defendant contends that it is not reasonable to suppose that in machining the Model A cams it would ever have gone back from a speedy machine like the shaper to the slow and expensive grinding method.

Plaintiff submitted no evidence on the practicability of the modifications in the shaper proposed by defendant, but rather relied on the aforementioned testimony of Herklotz that the Ford shapers could not have been used on the Model A or tractor camshafts. Plaintiff contends that defendant should not be allowed to shift its position on the accounting; that, further, the modified shaper cannot be considered an acceptable standard of comparison because it was not represented by a completed machine at the time of infringement; and, finally, even if it were a good standard, costs of production upon it cannot be computed from the present record.

The question of whether, and to what extent, modification of an available machine is permissible in a standard of comparison is a difficult one. The practical factors on either side can readily be seen. On the one hand, it is difficult to know whether the modified machine would work satisfactorily in actual practice, whether the change would have occurred to mechanics at the time of infringement, and precisely how costs would be affected by the modification. If too much liberality were to be allowed, a wide field would be opened in patented accountings for speculation as to how existing devices could be adapted for new uses and to get better results. Human ingenuity can always conceive of ways of improving methods followed in the past; and infringers caught with a decree against them may be expected to be much more adept than at the time of infringement in thinking up other methods which might have served their purposes as well. On the other hand, there is equal danger in not permitting modification in that an infringer may be mulcted in a large recovery of profits, when a simple adaptation of a machine available from the start of infringement would have rendered it as advantageous to him as the infringing device. Very often, changes in dimensions of a machine are necessary to adapt it to a particular work, yet no one would think of objecting to a machine on that ground alone. Plaintiff, in fact, does not claim that the necessity of a change such as that made in the overhead cams of the Walcott machines to adapt to it the Model A would be cause for rejecting it as a standard. It would be unrealistic not to recognize the frequency with which modifications in existing machines for special purposes are made in actual practice.

It is surprising that there are so few cases on the question thus encountered. The leading case is the decision of our Circuit Court of Appeals in *National Tube Co. v. Mark*, 10 F. (2d) 430 (C. C. A. 6, 1929). There the defendant relied for a standard of comparison upon a machine not regarded as usable during the infringing period and which would not have been usable except for changes not completed until after the termination of infringement, the modified machine being demonstrated on the accounting. The court, finding that the modified machine was practicable, held it a good standard of comparison on the

ground that the same mechanical ability which was later developed would have appeared had the defendant been forced to turn to some other than the infringing machine. A similar decision was reached in *Oneal v. San Jose Canning Co.*, 33 F. (2d) 892 (C. C. A. 9, 1929), where a modification of a device made by one of defendant's employees prior to the infringement and used experimentally at that time, and which was used in production after an injunction was issued, was held to be a good standard of comparison. In *Brown v. Lanyon Zinc Co.*, 179 Fed. 309 (C. C. A. 8, 1910), a modification in use, rather than design, of an existing machine was approved, the court adopting as a standard of comparison for roasting zinc a furnace which had previously been used only for heating copper, but which was found adaptable to the former use. Reference should also be made to *Columbia Machine Corp. v. Adriance*, 79 F. (2d) 16 (C. C. A. 2, 1935), where it was suggested that a machine developed after infringement, if sufficiently obvious, might be a standard.

Two cases are cited by plaintiff in opposition to the rule contended for by defendant. In *Expanded Metal Co. v. General Fireproofing Co., supra,* the District Court stated that the standard must have been in existence in its completed form prior to the time the infringer appropriates the patented process. However, the court there was not dealing with the modification of a process in use prior to infringement, but rather with a process which was in its experimental stages until after infringement. In *Philadelphia Rubber Co. v. Reclaiming Works, supra,* the District Court, citing the *Expanded Metal* case, rejected a process known before infringement, but which was a mere paper process then and not used advantageously until after infringement, on the ground that a modified process was not a proper standard of comparison. The decision on this point was affirmed by the Circuit Court of Appeals on grounds not entirely clear. The statement of the court in its broad form seems inconsistent with the rule in this circuit in the *National Tube* case, although it is possible the two cases could have been distinguished on their facts.

The rule which in principle seems correct and which is in harmony with the weight of authority and with the *National Tube* case would seem to be that a modification of

a machine available in its original form at the time of infringement is acceptable as a standard of comparison under certain limitations, as follows: (1) the modified machine must be workable; (2) the modification must not represent a radical departure from the principle of operation of the original or involve inventive genius itself; and (3) the cost of doing the work on the modified machine must be capable of calculation with reasonable certainty. It seems clear in this circuit that the mere fact that some modification must be made to adapt it to the work done by the infringing machines is not a fatal objection to the machine as a standard of comparison.

Considering the evidence here, I am convinced that, with the only problem being one of bearing interference, defendant could have adapted the shapers for use on the Model A shaft; and the probability is very strong that it would have done so if it had continued to use the shapers until the time of the changeover to Model A production and if the Walcotts had not been available at that time. The modification adopted would probably not have taken the precise form of those suggested here, but some practicable modification along the lines here suggested could almost certainly have been accomplished.

The method proposed by defendant of using two shapers to machine each shaft, four cams being shaped on each, would certainly have worked, and would have involved very little change in the design of the original machine. Costs by this method can be computed on this record with reasonable accuracy, since they would be approximately double (or slightly less) the costs of the shaper of the original design. At the same time, they would still be substantially less than with the grinder; consequently, if all other standards proposed by defendant for the Model A should be rejected, the double shaper method should be used in preference to the grinder.

However, I am sufficiently convinced of the practicability of the modifications of the shaper which permit the Model A shaft to be machined in a single operation to adopt that type of machine as the standard of comparison for that shaft. The problem to be overcome in adapting the shaper to the Model A shaft does not seem to be one of unusual difficulty. Careful inspection and scrutiny

of the proposed modifications disclose no reason why if the original shaper would work they should not also; nor do they seem to be especially ingenious or change the principle of operation of the machine. These conclusions are reinforced by the testimony of Oberhoffken, Brush, and Pioch, which was not controverted. The strongest evidence against them is the fact that in 1929 when defendant was casting about for a substitute for the Walcott lathes it gave no consideration to the shaper but instead experimented with the development of a new type of machine. However, the problem was not presented to it then in the same form as it would have been if it had used the shapers through the Model T production and was trying to find a method for machining the new Model A shafts. The testimony of Herklotz on the infringement trial also tends to mitigate against the use of the shaper as the standard of comparison for Model A production, but, while this has caused me some difficulty, I do not think defendant should be precluded by the testimony of one of its employees from showing the true facts with respect to the use of the shapers.

I do not think it necessary to pick out a particular form of modification to be used as the standard; but, if it should be thought necessary to do so, I would select the one suggested by Oberhoffken. It should be noted that the choice of the modified shaper as a standard of comparison does not involve the adoption of a machine not in existence at the time of infringement, but rather one which was commercially used for ten years before the infringement adapted to perform a particular type of work on which it could have been used, had the necessity appeared. This is in full accordance with the principle of *National Tube Co. v. Mark, supra.*

Some difficulty is involved in determining costs on the modified machine, since, other things being equal, it is probable that with either form proposed here or any other form which could have been adopted for the Model A shaft costs of operation would be somewhat increased over the original form. However, I think due allowance can be made for that factor. In my opinion, the court should resolve here to avoid the one result which seems certainly unjust of using the grinder as a standard of comparison on the

Model A when there is little likelihood that the defendant would ever have been forced to use it. Doubts as to speed and costs of the standard can be resolved against the defendant. This is in line with the approach taken by the Supreme Court in the recent case of *Sheldon v. Metro-Goldwyn Pictures Corp.*, 309 U. S. 390 (1940) upon a related problem in an accounting case.

The record is less satisfactory with respect to the modification of the Model A shaft to permit a shaper of the original design to be used in machining it. The practicability of changing the design of the shaft has not been as thoroughly explored in the trial as the practicability of adapting the shaper itself, and the effect of the changes upon the design and cost of the automobile engine is not clear. At least one of the methods originally proposed—the one involving the use of a detached end bearing—was later rejected as impracticable by defendant's own engineer, Weyl, and in fact would require the production of an extra part and numerous extra operations. Similar objections can be made to the other modifications presented, which, however, I believe it unnecessary to state here. I accordingly think the modified shaper is to be preferred to the modified shaft in the selection of the standard of comparison.

b. Standard for Tractor Shaft.

The choice of standards for the tractor camshaft is between the Westinghouse lathe, the shaper and the grinder. The Westinghouse machine should be rejected for the same reason already stated with respect to the Model A shaft. As to the shaper, the mechanical problem in using it is the same as with the Model A (the situation with respect to bearing interference being identical); however, the production problem is very different.

The grinder was used continuously to machine the tractor shaft until the purchase of the Walcott lathes, except for a brief interlude in 1923 when the Gordon machine was experimented with but rejected. During this time, the defendant was receptive to a less expensive method of doing this work. Oberhoffken designed his modification of the shaper for this purpose, but it was not built because it was felt that the production of the tractors was too small

and its future too uncertain to warrant the construction of special production machines. While such machines were perfectly feasible for the tremendous Model A production, the testimony of witnesses called by the defendant itself indicates that at no time did tractor production become great enough or its future sufficiently certain to justify the construction of a special shaper for them. A good deal of work beyond Oberhoffken's rough sketches would have been necessary before blueprints could be completed and the machines ordered; they would no doubt have been considerably more expensive than the Model T shapers; and it would have been difficult to find a use for them if tractor production were discontinued, since the shaper inherently is not an adaptable type of machine. The purchase of the ready-built Walcotts was obviously quite a different problem. I think therefore the shaper was not available to defendant within the meaning of the cases setting forth the requirements for a good standard of comparison. Despite the demand for improved machinery for the cams, defendant did not construct a modified shaper, nor did it alter the tractor camshaft. Consequently, the Landis grinder, which Ford was using and would very likely have continued to use except for the purchase of the Walcotts, should be adopted as the standard of comparison. While it is possible that the resultant savings from the use of the Walcotts are higher than the cost of constructing two shapers for the tractor the same point could be made by defendant with reference to its production in 1919 to 1924, when it continued to use the grinder, although the construction of a shaper might, in retrospect, have saved it money.

c. Effect of Choice of Incorrect Standard.

Defendant claims that if the court finds that plaintiff has selected the wrong machine as a standard of comparison it must be restricted to nominal damages for the production to which it is applicable, citing *Empire Rubber & Tire Co. v. DeLaski Co.*, 281 Fed. 1 (C. C. A. 3, 1922), and *Dunkley Co. v. Central California Canneries*, 7 F. (2d) 972 (C. C. A. 9, 1925). However, it does not appear that in those cases there was other evidence, as here, from which savings with reference to the proper standard of comparison could be ascertained. That the evidence submitted

by defendant can be used in computing the profits to which plaintiff is entitled is seen from *Producers' & Refiners' Corp. v. Lehmann, supra,* where the court rejected evidence of experts called by plaintiff estimating the cost of production and sale of oil treated with the infringing process, but, instead of dismissing the case, computed such costs from evidence submitted by the defendant. Furthermore, it would seem that the correct standard was more obvious in the cited cases than here—in view of the testimony of Herklotz in the main trial, and the fact that defendant's accounts do not state the nature of the shaper relied on as a standard, plaintiff can hardly be criticized for selecting the grinder as the standard, nor could it be expected on the accounting to think up and present methods of adapting the design of the shaper to the Model A shaft. Under the circumstances, it would seem to be up to defendant to prove the availability of the shaper for the Model A and the cost of using it.

2. Savings from Use of Infringing Machines.

The next problem is to compute the amount of the savings realized by the defendant from the use of the Walcott lathes, as compared with what it would have cost if it had used the standards of comparison instead. Under the law, the plaintiff is entitled to recover all kinds of savings from the use of the infringing machines which can be computed with reasonable certainty. If the use of the infringing machine results in savings in some items of cost coupled with losses in others, the losses are offset against the savings. The savings accountable take many different forms, depending on the nature of the particular case. There may be a reduction in labor or machine costs in the operation performed by the infringing machine itself. There may be reduced labor costs, with increased machine costs for the same operation offsetting them, or vice versa. The introduction of infringing machinery may affect other operations in the defendant's plant, either decreasing or increasing their cost or adding new operations or eliminating old ones. To mention a few examples of the kinds of savings the courts have held the patentee could recover, in *Tilghman v. Proctor, supra,* the saving was in chemical materials, and in *Williams v. Railroad Co.,* 18 Blatchf. 181,

it was found in the lower cost of using kerosene oil as compared with lard oil for locomotive headlights. In *Morgan Construction Co. v. Forter-Miller Engineering Co.*, 234 Fed. 324 (C. C. A. 3, 1916), the saving was in labor costs; and there were some operations prior to the infringing one which were added and some eliminated upon infringement, the cost of which was taken into consideration. In *Doten v. Boston*, 138 Fed. 406 (C. C. A. 1, 1905), the savings were found in the lessened repairs from carelessness resulting from the use of the patented device. In *Lawther v. Hamilton*, 64 Fed. 221 (C. C., Wis., 1892), they were represented by a greater yield of oil resulting from use of the patented process; and, somewhat similarly, in *Fullerton Walnut Growers' Ass'n v. Mfg. Co.*, 166 Fed. 443 (C. C. A. 9, 1908) in a smaller percentage of culls. Other illustrations are found in *Webster Looms Co. v. Higgins*, 43 Fed. 673 (C. C., N. Y., 1890), where the saving lay in machine costs, and in *Brickell v. New York*, 112 Fed. 65 (C. C. A. 2, 1901), where it consisted of lower fuel costs.

Mathematical exactness in computing savings in patent cases is obviously impossible, and is not insisted upon by the courts: the only requirement is that they be proved with a reasonable degree of certainty. *Fullerton v. Anderson Mfg. Co., supra*; *Doten v. Boston, supra.*

In each case, it is necessary to analyze the entire situation to ascertain which elements of the costs and revenues of defendant remain constant and which ones are altered by a change from the infringing machinery to the standard of comparison. Since in computing costs we must work with the records available, an understanding of the system of cost accounting used by the defendant here is necessary. A primary division is made in defendant's accounting practice between administrative and selling expenses, on the one hand, and manufacturing expense on the other. The former can be disregarded so far as this case is concerned; it is obvious that the use of the Walcott in preference to the shaper or the grinder would not affect selling and administrative expense, since the identical product is obtained with all three types of machines. Similarly, since the product is the same, the price and the volume of sales must be assumed to remain constant with all three machines. It may be that the substitution of more effi-

cient machinery (such as the Walcott in place of the grinder) has the effect of reducing prices as well as increasing labor costs, in view of the well-known tendency for profits from labor-saving machinery to be shared by the manufacturer with consumers and employees. However, any result of that sort is too remote and speculative for computation; no claim for a deduction on that account is made by defendant, and I know of no case which takes it into consideration. Consequently, the savings in the use of the Walcott lathes in place of the standards of comparison to machine the defendant's cams boil down to savings in the cost of production or manufacturing cost.

Under defendant's method of accounting, the process of determining its manufacturing expense is centered around the effort to determine the cost of each part going into the automobile or other machines sold by it. Its purpose in computing the cost of the part is (1) to price the finished product, and (2) to evaluate its inventory for income tax purposes. It does not use its cost accounting system to control costs of production. Defendant's plant is divided into a large number of departments, the successive operations on the camshaft taking place in several departments. At intervals (averaging about once every two or three months during the accounting period) manufacturing costs are computed for each part for a single month, the summary costs for the part being set down on a cost summary card. On these cards, the manufacturing cost is divided into three categories: (1) material; (2) direct labor; and (3) burden. Material cost is the cost of the raw stock for fabricating the part. Direct labor consists of the wages paid to the operators of the machines directly used in producing the finished part. This is determined by dividing the total time of all direct labor in the department for the month in question by the number of shafts produced, to get a minute labor cost, and multiplying the result by the average departmental labor rate to get the labor cost per unit expressed in dollars and cents. Burden includes all other manufacturing expense consisting of some thirty elements. In computing the burden cost of the part, some of its elements (such as machine depreciation) are costed directly in each department; other items, not capable of direct computation in the department,

are computed for the whole factory and then apportioned among the different departments on some recognized basis (such as relative area, direct labor, etc.), depending on the nature of the item. The total burden expense in the department is then divided by the total direct labor expense, resulting in a departmental percentage ratio of burden to direct labor, which is used in turn in computing burden cost per unit for the cost summary cards.

In its routine calculation of costs, defendant does not make any attempt to go behind the cost of the part to compute the cost of the individual operations in producing it. The only occasions (apart from lawsuits like the present one) when it becomes necessary for the defendant to ascertain the cost of such operations are (1) in evaluating the inventory of unfinished parts for tax purposes, and (2) in determining prices on the infrequent sales of unfinished parts. In computing the cost of operations for these purposes (during the accounting period, at least), unit burden costs for each part were apportioned among the various operations by using the departmental burden percentages (based on direct labor cost). (The actual procedure used to determine the cost of a part in process was to multiply the total labor and burden cost per unit in the department by the percentage of the time taken for operations already performed upon the part to the total time taken for all operations in the department, and then add to the resultant figure the cost of the material entering the department.)

In comparing manufacturing costs of using the Walcott lathes and the standards of comparison for the camroughing operation, it is obvious that the cost of the material entering the department remains constant, so this factor may be immediately eliminated from consideration. With respect to the question of scrap loss, the defendant has kept no records of scrap loss on individual machines, and no difference in this item as between the three types of machines here in question has been shown. The problem of determining comparative costs of the remaining elements —labor and burden—can be broken down into two parts: (1) determination of savings (or losses) in the cost of the operation performed by these machines; (2) determination of savings or losses in other operations which may be affected by the use of one type of machine rather than

another to machine the cams. As to the latter, it appears conclusively that no other operations were eliminated by the adoption of the Walcott lathes. Nor does it appear that the time for performing any other operations was reduced by their use. (It is possible that tolerances on the roughing operation were stepped up during the accounting period, resulting in a reduction in finish-grinding time, but there is no clear evidence to this effect which would permit a cost computation.) However, it is claimed by the defendant that the introduction of the Walcott lathes made necessary a straightening operation on the camshafts not used or required with the shaper. If so, it is clear, upon principle and authority, that the cost of performing it should be offset against any savings which may be found in the cost of the cam-machining operation itself. (See *Morgan Construction Co. v. Forter-Miller Engineering Co., supra.*) Since this question can be disposed of more quickly than the question of the comparative cost of the infringing operation itself, I will consider it first.

a. Saving or Loss in Other Operations: Straightening.

The issue as to straightening is an important one, since it is largely responsible for the difference between the loss found by defendant from the use of the Walcott lathes on the Model T shaft and the profits in excess of $40,000 claimed by plaintiff. It appears that at several points in the manufacture of a camshaft the shaft becomes slightly crooked, and it is necessary to straighten it before performing certain operations upon it. Consequently, there have always been several straightening operations in producing a camshaft, but the claim here is that an extra one immediately preceding the cam-machining operation was required with the Walcott lathes, which was not necessary with the shaper. The evidence relied upon in support of this claim can be summarized as follows: (1) the fact that such operation appears upon the only time study for the shapers in evidence taken in 1924 is omitted from a time study taken later in the year after installation of the Walcotts; (2) the testimony of Ford employees, supplemented by that of a representative of the Walcott Company, that it was found necessary to add this operation when the Walcotts were installed; (3) expert testimony that the shapers had an

automatic straightening action, due to the downward pressure of the shaper tools forcing the camshaft against the subjacent steady rests, while the pressure of the Walcott tools upon a shaft floating more freely in space had no such correctional tendency.

On the other hand, independent expert witnesses testified that straightening the shaft before machining the cams was always considered the proper practice with all types of machines. Brush and Pioch, defendant's principal experts, both testified that the necessity of straightening could have been eliminated by modification of the steady rest or the addition of other steady rests. Furthermore, it appears that the standards of workmanship in manufacturing the Model T car were raised from time to time; although there is no record of a change in tolerance for rough-machining the cams, such a change would not necessarily appear in the records.

The conclusion I draw from this and other evidence not detailed here is that while the use of the Walcott lathes may have been the occasion for adding the straightening operation, it was not the underlying cause for doing so, the operation being rather attributable to improvement in defendant's standards of workmanship. Under the testimony of its own witnesses, defendant could have made the Walcotts exactly like the shapers with regard to the necessity of straightening by simple changes with respect to steady rests, but it preferred instead to adopt the straightening operation, which was undoubtedly the better practice. If the extra straightening operation was in fact attributable to the difference in machines, it is indeed difficult to see why the defendant upon discovery of that fact did not reject the Walcott machines instead of buying more and then discarding the shapers. I therefore reject this operation as an element of the cost of using the infringing machines, not on the ground that it was not added upon their installation (because I think it was), but rather on the ground that its addition was not attributable to differences between the two machines. I recognize the rule that an infringer need account only for actual and not reasonable profits (*Tilghman v. Proctor, supra,* and many other cases); but in making a comparison between two types of machinery similar factors on both sides should be kept con-

stant, and the actual operation of the infringing machines should not be weighed against a theoretically ideal operation of the standard of comparison.

This conclusion becomes much clearer with the Model A shaft, because of its greater weight and rigidity and the fact that the modification of the shapers presented by defendant for that shaft differ from the original with respect to the pressure tending to correct a bowed shaft. It is to be noted that no claim of such a deduction has been made with regard to the grinder.

b. Savings in Cam-Roughing Operation.

(1) Direct Labor Savings.

The problem of savings is therefore resolved into the question of what savings, if any, were obtained in the cam-roughing operation itself from the use of the Walcott lathes. The first type of cost to be considered is direct labor. To determine the direct labor cost of turning out the infringing production on the various machines, it is first necessary to know the average speed at which the operator could machine camshafts on each type of machine. With this information plus a knowledge of the wage rates paid to the operators and the total production of camshafts during infringement, total direct labor costs with each machine can be readily computed. Average departmental wage rates are either shown directly on records available or have been closely estimated for all the months of infringement; and, since a uniform wage rate for productive labor prevailed in the department in which the infringing operation was performed, their use results in substantial accuracy. It affirmatively appears from the record that the wage rate would be identical with the Walcott machines and the standards of comparison. The direct labor costs of the various machines are therefore inversely proportioned to their speeds of production, with adjustment made for the fact that one man operated two shapers or Walcott lathes but only one grinder.

The determination of the average rate of production of each machine is a matter of some difficulty. Defendant has not kept permanent records of the actual rate of production obtained on the individual operations in producing the part. (It appears that daily rates of production for the

Walcotts were recorded on blackboards for at least part of the period of infringement, but were erased the next working day.) Throughout a large part of the accounting period stop watch time studies of the operation of its machines were made by defendant from time to time as a guide to its foremen, which studies show the expected rate of production; but these have not been systematically retained and only a few are available for the machines in litigation. As might be expected, the rates of production shown by the time studies do not always coincide with actual speeds of production, as is shown by production records for the complete camshaft. A complete analysis of all the evidence on rates of production would be impracticable here. The difficulty of fixing them is well illustrated with the Pioch machine, where a time study in 1931 gave their speed as 42 shafts per hour and a production specification the same year as 75, while the consensus of recollection of witnesses fixed it at 55 to 60.

(a) Speeds of Production on Model T Shaft.

The figure of 25 camshafts per machine per hour or 50 per operator per hour is agreed upon as the most nearly accurate figure for the average speed of production of the shaper on the Model T shaft. This figure is shown by a stop watch time study in 1924 and other production records of the defendant, and was also testified to by witnesses, although some witness gave the production rate as 20 per machine hour.

There is sharp dispute about the rate of production of the Walcott machines on the Model T shaft, 37.5 and 35 shafts per machine hour being adopted by plaintiff and defendant, respectively. The former figure is shown upon an operation sheet of defendant showing productive capacity, dated March 16, 1925, and apparently taken from an earlier production and machine specification, which records, according to the testimony, were based upon a careful study of the situation. There is a good deal of evidence tending to support a speed of 35 or slightly less. This figure is given by a stop watch time study taken in October, 1924, just before removal of the machines to the Rouge plant; and it is also shown by a study by the purchasing department of the actual operation of the machines at Highland

Park over a period of a number of weeks. A Walcott engineer calculated the probable speed, on the basis of the machine cycle, at only 32.5 shafts per hour. The guaranteed production of 45 was based upon 100% efficiency from the machine running in a high gear, which was never used by defendant in production. The testimony of Ford employees based upon recollection also tends to support the 35 figure.

On the other hand, there is some evidence tending to support a much higher speed, up to 58 per hour in the later years of Model T production, resulting from the use of faster motors. It seems probable under the evidence that the speeds were increased after removal to the Rouge plant, although, of course, it would hardly be fair to consider increases resulting from external factors, such as improved conveyors, which would operate to increase shaper speed as well. If the evidence is equally balanced between 35 and 37.5, I think the latter figure should be used, in view of the fact that many of the records of defendant which would help to clear up the question are missing. Moreover, the higher of two possible shaper speeds was adopted, and the absolute speed of the two machines is not as important in comparing costs as the differential between them. Under all the circumstances, I think the figure of 37.5 shafts per machine hour or 75 per man hour is conservative and should be adopted by the court.

(b) Speeds of Production on Model A Shaft.

The Model A shaft was the same length as the Model T, but was thicker and approximately twice as heavy. The cams were of the same width, but had a more pronounced lift on the nose and a slightly larger base circle. The steel in the shaft was of slightly harder composition. On the question of the rate of production attained with the Walcott machines on the Model A shaft, there is comparatively little record evidence, no reliable time study being available. The only record of value is a report prepared in 1930 from existing time studies for use in the Soviet Autostroy plant, which shows production speeds on Ford machines in even multiples of five and which states the Walcott speed as 30 shafts per machine hour. Theoretically, if the same motor were used, the Walcott lathes would turn the Model A cams

as fast as the Model T, although undoubtedly in practice the harder shaft and larger perimeter and lift would cut the speed down considerably. Handling time would be increased because of the heavier shaft. Ford employees testified that greater difficulty was encountered in machining the Model A cams with the Walcotts, and their recollection of speeds obtained ranged from 25 to 30. Plaintiff uses a speed of 32.711, computed by reducing the speed of 37.5 on the Model T shaft in inverse proportion to the increased periphery of the Model A shaft. I think, however, that there is little evidence to support that speed, and I prefer to adopt the figure of 30 per machine hour or 60 per man hour, as shown on the Autostroy report and as adopted by defendant. Again, it should be pointed out that the absolute speeds of the shaper and Walcott are not as important as relative speeds.

The question of shaper speeds on the Model A shaft is more hypothetical, since they were never used for that purpose. If there were no problem of bearing interference and a shaper of the original type could have been used, the larger cams would have probably decreased the speed of production somewhat. While there is some evidence that a wider cut on the cams could have been taken with a more rigid shaft, tending to compensate for the greater perimeter, still the same general factors which operated to reduce the Walcott speeds would no doubt affect the shaper, and probably in about the same proportion. For a shaper of the original type, therefore, the Model T speeds should be reduced for the Model A shaft by 20% (the percentage of reduction used for the Walcott lathes), resulting in a figure of 20 shafts per machine hour.

However, I think an additional reduction should be made because of the lower speeds which would probably result from the modification of the shaper to adapt it to the Model A shaft. With the Oberhoffken modification, for example, if the speed of each of the two cutting strokes was equivalent to the speed of the cutting stroke on the original, the machine time would be increased one third. While the cutting speed of the tools is not the limiting factor in the speed of the shaper, but rather the inertia of the parts upon the rapid change in velocity of the ram, it is very doubtful if the Oberhoffken or any other form of modification could have been made as fast as the original, other

things being equal. Because of that doubt, I think the speed of the Model A shaper should be reduced an additional 10%, resulting in a final figure of 18 shafts per machine hour or 36 per man hour (which is approximately 18% under the speed adopted by defendant's account, which was based upon the relative perimeters of the Model A and Model T shafts). Defendant makes no allowance in its accounts for slower speeds on the modified shaper, claiming that the original shaper was designed very conservatively and that by substitution of a light alloy ram and a stronger driving mechanism it could have stepped up the speed of the original by at least 50%. While it may be that this could have been done, I do not think that factor can be taken into consideration in determining speeds in this lawsuit. The improvements suggested were never made by defendant, even with the nine shapers ordered in 1923, although the same necessity was present for making them then as now. It is to be noted that the speed of the Walcotts could similarly have been, and later was, increased by rearrangement of the overhead cams, but no claim is made that the faster speed should be used for the accounting period.

(c) Speed of Production on Tractor Shaft.

It is agreed that the grinder produced tractor camshafts at an average rate of 8 per machine and man hour. There is a dispute, however, as to whether the rate of production on the Walcott lathes was 15 or 20 per machine hour, although the use of one or the other of these figures does not make a very substantial difference in the result. A time study in defendant's English plant showed a production speed of slightly less than 15 tractor shafts per hour, but information is not available as to motor speeds or handling methods in that plant and it seems probable that a higher rate of production was obtained in the United States. The recollection of speeds by Ford employees ranged from 15 to 25. The guaranteed production was 30. In my opinion, the figure of 20 shafts per machine hour or 40 per man hour should be adopted, which figure is very close to that which is obtained by reducing the speeds found for the Model T and Model A shafts in inverse proportion to the greater periphery of the tractor cams.

(2) Other Savings: Overhead or Burden.

The next problem is to determine the savings of defendant, if any, from infringement, in manufacturing expense other than direct labor and materials. In defendant's accounting system, all such expenses are grouped under the heading of burden. It is obvious that some burden costs—e.g., machine depreciation and repairs—will vary with the type of machinery used to perform a particular operation; and, in addition, a variety of indirect expenses may be affected. Defendant's burden costs as of the time of the trial were broken down into thirty-one different items, thirty of which are applicable to the accounting period and which I set forth here for the court's information, as follows:

> "Administrative salaries; depreciation of land improvements; depreciation of buildings; depreciation of machinery; depreciation of durable tools; depreciation of factory and miscellaneous equipment; depreciation of freight car equipment; depreciation of locomotive equipment; depreciation of power equipment; insurance; experimental engineering and designing; moving and re-arranging department; factory supervision; final inspection; miscellaneous manufacturing expense; power operations; repairs to land improvements; repairs to buildings, fixtures and structures; repairs to machinery; repairs to durable tools; repairs to factory and miscellaneous equipment; repairs to freight car equipment; repairs to locomotive equipment; repairs to power equipment; expense of tools; insurance (employees' liability and compensation); sweeping and cleaning; taxes (state, city and county); miscellaneous services for employees; timekeeping, pay rolls and factory clerical salaries."

As previously stated, some of these elements of burden are costed direct in the department and others are first costed for the whole factory and then apportioned among the departments on arbitrary bases. For the infrequent occasions when it was necessary to determine the cost of operations in producing a part, the departmental ratios of burden to direct labor costs were used to apportion burden among the operations. Records showing the breakdown of departmental overhead into its component elements for the

accounting period have been destroyed, although total departmental overhead figures are available. Permanent records have been kept by the defendant of the cost and depreciation rate of each machine purchased by it; and there are scattered records of overhaul and tool costs available. However, no systematic attempt has been made to compute individually the cost of repairs, tools, and power consumption attributable to each operation.

Plaintiff and defendant adopt two different methods of determining overhead savings in this case. Defendant uses what may be described as the breakdown method of determining them. It assumes that nearly all of the burden expenses are fixed costs, not affected to any appreciable extent by a change in machinery for the operation on the cams. Defendant's accountants consider the principal variable factors in a comparison of costs on the Walcott lathes and shapers to be those for depreciation and maintenance of machinery and tool costs; and their method has been to reconstruct from the records available the costs of each of these items on the two types of machines. Their final computation shows a slight advantage to the Walcott lathes on depreciation, which is more than offset by considerably greater expense of maintenance and repairs upon them, as follows:

	Cost on Shapers	*Cost on Melling lathes*
Model T shaft		
Depreciation	$19,248.69	$16,921.58
Maintenance repairs	8,252.10	14,853.80
Extraordinary repairs		23,579.66
	$27,500.79	$55,355.04
Loss on Melling lathes	$27,854.25	
Model A shaft		
Depreciation	$31,728.94	$27,645.49
Maintenance repairs	25,234.66	45,829.12
	$56,963.60	$73,474.61
Loss on Melling lathes	$16,511.01	
Tractor shaft	(Not calculated, but assumed to follow results with other shafts.)	

Defendant's accountants believe that costs of tools, power, factory supervision, and costs incident to housing the machines, which were not computed because of insufficient records, would have been greater on the Walcott lathes than with the shapers.

Plaintiff's accountant, on the other hand, uses the departmental burden percentages based upon direct labor to compute burden savings. Since these percentages generally run in excess of 100% for the accounting period, the burden savings found by his calculation are somewhat greater than the savings in direct labor. Plaintiff concedes that theoretically the breakdown method used by defendant is the better one, but contends that an accurate computation cannot be made on that basis because of insufficient records or other evidence of costs of the individual elements of overhead here. According to plaintiff's accountant, Mr. Moise, the kind of overhead costs which remain unaffected by a change in cam-shaping machinery constitute only an insignificant portion of total overhead. A large group of items (particularly factory supervision), not considered in defendant's accounts, are said to vary generally in direct proportion to direct labor costs. A third substantial group of which the most important is machine depreciation and repairs, are ordinarily affected by a change of machinery but not necessarily in proportion to, or in the direction of, direct labor costs. As to the latter group of costs, however, Mr. Moise believes that in this case they will average out to vary approximately in direct proportion to direct labor costs. A computation made by him of comparative costs with the Walcott lathes and shapers for Model T and Model A production (assuming the shapers could have been used on the Model A shaft) shows savings with the Walcotts of approximately $120,000. However, he considers, in view of the way defendant has kept its cost records, that overhead savings should be computed by use of the departmental burden percentages, even though they result in a smaller figure than that.

In considering the authorities on the proper method of determining savings of this type, I have found no reported patent cases where the defendant's profits were determined, as here, by the standard of comparison method which discuss the treatment of overhead savings as such, but consideration is given to overhead, if at all, only in terms of

its elements. (See, e.g., *Morgan Construction Co. v. Forter-Miller, supra,* where plaintiff restricted its claim to savings arising from a lower cost of labor, and *Carson v. American Smelting Co., supra,* where the defendant's account included a comparison of costs of a number of items which in the Ford system of accounting would be classified as burden, but which were not discussed in terms of burden.)

However, there are a large number of cases dealing with overhead where the infringement consisted of the manufacture and sale of a patented thing, rather than its use. The problem arises when (as is usually the case) the infringing business accounts for only a small part of the total business of the defendant, and where part of the overhead expenditures of the entire business are claimed as a deduction from gross profits of the infringement. The situation in those cases is in effect only the converse of that in the case at bar where the infringement was one of use: in those cases, the defendant claims a deduction for overhead expenses *increased* by infringement, while here the plaintiff claims as profits *decreased* by infringement. Consideration of them is therefore pertinent. It is significant that the claims made by the parties in those cases closely resemble those in the case at bar, one side contending that the increase in overhead from infringement was negligible and should be disregarded, while the other contends that overhead should be charged to the infringing business on the same proportion it bears to the whole business.

The general principle established by the decisions on overhead referred to is that the one claiming the benefit of overhead expenses must show, and the burden is on him to do so, what portion of total overhead expenditures were actually attributable to the infringement. *Levin Brothers v. Davis Manufacturing Co.,* 72 F. (2d) 163 (C. C. A. 8, 1934); *Haiss Manufacturing Co. v. Link-Belt Co.,* 63 F. (2d) 479 (C. C. A. 3, 1932); *Sheldon v. Metro-Goldwyn Pictures Corp., supra*; *Krentler-Arnold Hinge Last Co. v. Leman,* 24 F. (2d) 423 (D. C., Mass. 1928); Cf. *Horvath v. McCord, supra.* Usually, this involves segregation of overhead into its constituent elements, accompanied by proof showing which ones have been increased by infringement. *Levin v. Davis, supra*; *Standard Mailing Machines Co. v. Postage Meter Co.,* 31 F. (2d) 459 (D. C., Mass., 1929); *Horvath v. McCord, supra*; *Flat Slab v. Turner,*

285 Fed. 257 (C. C. A. 8, 1922). No case requires the infringer to go to the extent of proving every expenditure for overhead affected by the infringement, as this would be impossible from a practical standpoint. (See above cases and remarks of court in *Stearns-Roger Manufacturing Co. v. Ruth*, 87 F. (2d) 35 at 41 and 42, C. C. A. 10, 1936.) Overhead expenditures are rather dealt with under broad classes, analogous to the elements of Ford overhead set forth above, and each class is apportioned between the infringing and non-infringing branches of the business on some recognized accounting basis, such as proportionate direct labor costs. In cases, however, where it is found impracticable to separate overhead into its elements and treat them individually, the apportionment has been made by dividing all overhead expenses between the infringing and non-infringing branches on a recognized accounting basis, usually direct labor for manufacturing overhead. (See *Standard Co. v. Cropp Co., supra*, where general overhead was allocated between departments on the direct labor wage basis and total departmental overhead was then divided between the articles worked on in the department on the same basis; *Computing Scale Co. v. Toledo Computing Scale Co.*, 279 Fed. 648, 657-8, C. C. A. 7, 1921, where all manufacturing overhead was apportioned on a direct labor plus materials basis. With administrative and selling, as distinguished from manufacturing, expense, the basis of apportionment is usually relative gross sales of the two branches.) In some cases where the use of an overhead ratio for the whole business has seemed not to reflect accurately the actual increase in overhead from infringement, the courts have arbitrarily reduced the ratio to the point thought to represent the actual increase. (See, e.g., *Winchester Arms Co. v. American Buckle and Cartridge Co.*, 62 Fed. 278, C. C. Conn., 1894, where the court added 10% to the cost of labor and materials for the infringement in place of 26-1/5% overhead of the business in general; *Flat Slab v. Turner, supra*, pages 278 and 279.)

The courts recognize that there is no perfect method of apportioning overhead to the infringing business (*Standard v. Cropp, supra*; *Stearns-Roger v. Ruth, supra*), and accordingly take a practical approach to the problem, using the best method that the nature of the particular case and the records available will permit. This is well illustrated

by *Haiss Manufacturing Co. v. Link-Belt Co., supra,* where the defendant infringed by manufacturing and selling wagon loaders, which constituted a small fraction of its business. It kept no separate account of the overhead chargeable to the infringing business, and there was no evidence under which the elements of its general overhead could be apportioned. Defendant claimed that a proportionate part of its total overhead should be charged to the infringing line on the basis of direct labor costs, which showed a small profit to defendant. The court, being convinced that defendant had made a substantial profit from infringement, held that defendant had not sustained its burden of showing overhead expenses were increased by infringement in proportion to direct labor costs. It did not, however, leave overhead out of consideration entirely by awarding plaintiff the defendant's gross receipts from infringement minus only material and direct labor costs; but instead computed defendant's profits by taking the percentage of average clear profit from its entire business and applying this to the infringing business, thus taking overhead into account indirectly.

Since the problem of treatment of overhead in the case of the infringing manufacturer is only the other side of the problem with the infringing user, the principles above considered are applicable to the case at bar. In this case, it seems clear that from a theoretical standpoint defendant's method of computing overhead savings is the most accurate and the correct one. Overhead expenses do not always vary with direct labor costs incident to the use of machinery: it is common knowledge that in modern factories expensive labor-saving machinery is frequently adopted with which the great increase in some of the burden costs is more than compensated by the saving in labor costs. As between different machines available for the same operation, one may be the least expensive in depreciation cost, another in tool costs, a third in maintenance, and a fourth in labor. (See, as an example of this, defendant's account in *Carson v. American Smelting Co., supra.*) Defendant's system of apportioning burden among its departments recognizes that all kinds of burden do not vary in proportion to direct labor, different bases being used for apportioning the different elements. It is true that it apportioned departmental burden among operations entirely on a direct labor

basis, but for its purposes in doing this a refined method was not necessary. It would seem that defendant, by the adoption of an accounting method of distributing burden among operations for a different purpose, should not necessarily be barred from proving similar costs here by a better method, if available. On the other hand, it must be recognized that the adoption of a particular system of computing burden costs by defendant may result in its records being kept in such a way as to make it impossible to calculate them by a theoretically more precise method. Furthermore, it appears that the method of applying manufacturing overhead on the direct labor basis is generally accepted by accountants as the best one where it is impossible or impracticable to use a theoretically more accurate system.

Consideration of the problem leads me to the conclusion that, with the records available here, a computation of comparative overhead costs of the shaper and Walcott machines on a breakdown basis is going to be deficient in important respects. In the first place, it will be unsatisfactory with respect to important elements of overhead which defendant thinks it unnecessary to consider in the comparative cost study, but which would seem reasonably certain to be greater with the shapers than with the Walcotts. For example, a very important item of overhead, factory supervision, varies in general with the amount of direct labor, and consequently would be greater with the shapers. While, as pointed out by Mr. Moise, the addition of a single laborer in a department might not require an additional foreman, the point will eventually be reached when it will become necessary to add one. It would be unfair to charge the expense of the added foreman to the last productive worker taken on: it should be apportioned upon an average basis. If records of the cost of this element of overhead in the camshaft department were still available, the additional cost for the shapers could be calculated with reasonable accuracy: without such records or any reliable basis for estimation, the cost of this element by itself cannot be computed. The same situation prevails with the similar cost elements of employees' liability and compensation insurance, and timekeeping, pay roll, and clerical salaries. Another element of overhead costs which would probably be larger with the shapers, but which was disregarded by

defendant for lack of records, is that of power. There are some records indicating the use of a 7½ horsepower motor on the shaper, as compared with a 5 horsepower one with the Walcotts. Even if the motors were the same, however, power consumption (which in general varies with the rated motor power) would be proportional to the time consumed in the cam-roughing operation, and, in turn, with direct labor costs. While this element should not be disregarded if it can be determined, there is no evidence in the record from which its cost with the shapers and Walcotts can be computed as an individual element.

In the second place, as to the three items of overhead —machine depreciation, machine maintenance and repair, and cutting tool costs—which defendant admits are appreciably affected by a change from the Walcotts to the shapers on the cam-roughing operation, it is difficult, if not impossible, to state a satisfactory account of them as individual elements here, in view of the fact that defendant's accounting system has not been built around the effort to ascertain costs by operations, and the records available, particularly as to maintenance and repairs, are somewhat scattered. An analysis of these three items indicates, in my opinion, that they would probably vary in the same direction (and roughly in the same proportion) as direct labor costs on the shapers and Walcotts.

In my opinion, there is considerable merit to the criticisms made by Mr. Moise of defendant's treatment of these items. I do not feel that its accounts accurately reflect the actual saving or loss from the use of the Walcotts as compared with the shapers. With respect to depreciation, for example, defendant finds that, despite a 50% greater cost of each shaper (an average of $4,100 for the Walcotts as against $6,000 for the shapers purchased in 1923 and 1924) and despite the slower speed of the shapers which, other factors being equal, would mean approximately 50% more shapers to turn out the same production, depreciation costs are substantially the same for both. This conclusion is based primarily on the assumption that 13 shapers would do the work of 16 Walcotts, because 13 shapers actually turned out the largest production of automobiles in Ford history in 1923, while at least 16 Walcotts were always used for its automotive production. This method of cal-

culation, however, directly conflicts with that used by defendant in its plant to determine the same thing: its records of its productive capacity make the number of machines needed for its camshaft production inversely proportioned to the speeds of the machines. (See Defendant's Exhibit 247 and Plaintiff's Exhibit 154D on the main trial, both of which state that 14.5 Walcott lathes or 21.6 shapers are required for its production schedule.) Defendant overlooks a variety of factors which might account for the greater number of Walcotts being used, beside its assumption that the Walcotts were getting out of order more often: the extent to which the shapers may have been pressed to get out the 1923 production, the decrease in number of shifts after introduction of the Walcotts, the increasing development of an automatic conveyor system which would make it necessary to be certain of a smoother flow of camshafts through the line of production. It is very significant that in 1923, nine new shapers were ordered because of the demands of production; and it seems probable that their use had been continued, a number in excess of twenty would have been kept available.

With respect to maintenance, defendant's finding of substantially higher costs with the Walcott machines is based on two conclusions: (1) higher ordinary repair costs, because four maintenance men were employed in the department on the last two shifts to service the Walcotts as against only two men for the shapers; and (2) higher extraordinary repair costs for the Walcotts in the form of fourteen special overhauls in 1928, 1929, and 1930 at a cost of over $23,000, while the records show only three overhaul jobs for the shapers. These conclusions, however, overlook evidence showing that a different system of maintenance was followed with the two machines. With both machines, cleaning and minor repairs were done in the department. With respect to overhauls, however, each shaper was removed on an average of once a year to the main tool room for overhaul; while the Walcotts were taken apart and reassembled by the maintenance men in the department, the worn parts only being taken to the foundry toolroom for replacement or repair. The overhaul cost of the shapers, being chargeable to another department, was not computed in defendant's accounts, and if taken into consideration would lead to a very different result.

The reason for the special overhauls on the Walcotts from 1928 to 1930 is somewhat obscure, but it is possible they were attributable to the changeover to Model A production. In this connection, a serious objection to both the depreciation and maintenance accounts of defendant lies in their failure to consider the effect of the necessity of remodeling the shaper for Model A production. With the extensive modifications necessary to convert the Model T shaper into any one of the suggested Model A designs, the cost of the changeover to Model A production would unquestionably have been much greater than with the Walcotts: with at least some of the modifications it would have been necessary to build entirely new machines. Defendant's accountants, however, do not make allowance for the development cost of the Model A shaper; nor for the modification of the existing machines or the building of new ones; nor for the increased costs of purchase and maintenance of the more complicated mechanism. (In fact, defendant's depreciation account does not make allowance for increased costs of machinery around 1929 in valuing shapers added during Model A production, but instead their cost is figured at the 1923 rate.) Defendant's reason for this is not clear, unless it is proceeding on the theory that the speed of the shaper could have been stepped up by other changes to more than offset these costs.

Defendant has not computed cutting tool costs, because of insufficient records. However, the records which are available indicate the average original cost of the shaper tools was approximately four times that of the Walcotts, and this, together with a much shorter life (see Defendant's Exhibit A, Exhibits 8, 9 and 10), more than counterbalances the greater grinding cost of the Walcott tools, resulting in a substantial saving with the Walcotts.

Some criticisms could also be made of Moise's accountants of comparative costs of these three items, but, since it is not claimed by plaintiff that this method of computing overhead savings should be adopted by the court, I think it unnecessary to go into them here. Considering the entire picture, I am inclined to agree with the plaintiff that there are too many gaps to fill in to state a satisfactory account of overhead savings by the breakdown method adopted by defendant. It might be possible to fill in the

gaps by estimates, but on this record satisfactory estimates cannot be made of such costs, for example, as those for factory supervision with the two machines or those incurred in the modification of the shaper to adapt it to the Model A shaft. It would seem unfair, however, to ignore overhead savings, since it seems reasonably clear that substantial savings in those costs were realized by defendant in using the Walcott lathe in place of the shaper on Model T and A production. While it is recognized that application of general ratios of overhead to direct labor costs would lead to unfair results in many cases, I believe an analysis of the evidence here indicates that with the shaper and Walcott machines overhead costs by and large would vary in proportion to direct labor. While some of the elements of overhead would vary little, if at all, these static costs are offset by some elements (e.g., depreciation and cutting tool costs) which would probably increase with the substitution of the shapers for the Walcotts in a greater proportion than direct labor. I therefore adopt the method of computing overhead costs for these two machines by using the departmental percentages. I think this treatment is in line with the cases on the treatment of overhead in patent accountings, and also with the practice of cost accountants to apportion manufacturing burden on a direct labor basis where a more precise method is not feasible. It is to be observed that this method takes into consideration the increased depreciation and maintenance costs of the Model A shaper, since the reduction in speed for that form of shaper increases the overhead costs thus calculated, and since, moreover, the departmental overhead percentages ran considerably higher for Model A and Model T production.

In this connection, the language of Justice Cardozo in *Duplate v. Triplex,* 298 U. S. 448, 468, 80 L. Ed. 1274 (1936), may be quoted:

> "But the master has found, and the parties are agreed, that in a business of this order there is no method of accounting, not impracticably burdensome, whereby the costs of operation can be apportioned and distributed except upon an average basis. At all events, if such a method was available, the defendants did not use it. They kept their books upon the

basis of the method they decry, and measured loss or gain accordingly. Average cost, even if not identical with actual cost, is the best approximation known to accountants."

Thus far, consideration of the overhead problem has been limited to the comparison between the shaper and Walcott machines for Model T and A production. With the tractor shaft and the grinder as the standard of comparison, the situation is somewhat different. Depreciation costs do not rise with the grinder as compared with the Walcott in anything like the proportion of direct labor. Since one man operated two Walcotts but only one grinder, if six times as much labor were required with the grinder only three times as many machines would be needed. In addition, it appears that the machines themselves were only about half as expensive as the Walcotts. Finally, with the tractor, defendant was getting into such low production as to diminish the benefit from labor-saving machinery. Two Walcott machines, the minimum which could be economically used, probably provided a greater productive capacity than was needed for tractor production. Defendant's accounts indicate that three grinders turned out the large 1923 production, and all three cost only ¾ as much as the two Walcotts which replaced them.

Since other important overhead items, such as repair costs, would likewise not rise with the grinder as compared with the Walcott in proportion to direct labor costs, the use of the burden percentages based on direct labor, in the absence of countervailing factors, would greatly exaggerate actual burden savings. However, it is claimed by plaintiff that the cost of grinding wheels was so great that the burden percentages would most likely underestimate actual burden savings. There is conflict in the record as to this cost. In defendant's statements of account, the cost of a grinding wheel is stated as $7.50 each and its life is variously estimated at 65 to 90 hours. Mr. Moise's computation of grinding wheel costs for the Model A showing them to be only about 15% of direct labor costs (R. 2500) is apparently based upon an estimate of defendant in its Exhibit C (paragraph 10). However, the foreman of the camshaft department of the Nash Motor Company from 1919 to 1931 testified that their wheels for rough grinding

cams had a life of only fifty six-cylinder camshafts (or ten hours at five shafts per hour), which alone amounted to 83⅓% of direct labor costs. If grinding wheels at Ford had a comparable life (making adjustment for the smaller number of cams on its shaft), they would each machine 75 tractor shafts, at a cost of 10 cents per shaft or close to 100% of the direct labor cost.

Since the operation appears to have been identical at both plants, it is difficult to account for this wide discrepancy between Ford and Nash figures, unless some mistake has been made in defendant's account, such as the use of figures of life of wheels for finish rather than rough grinding. The Nash figures seem more consistent with the statement of defendant's Mr. Wibel on the main trial that grinding wheels were worn away quickly and were very expensive. Assuming, therefore, the correctness of the Nash figures and the existence of some mistake in defendant's accounts on this point, I think that, in view of the resultant heavy cost of grinding wheels, the departmental burden percentages may be fairly applied to measure burden savings without reducing them, except for the abnormally high figure of 674.22% for November, 1926, which I have reduced to 200%.

Total direct labor and burden savings from the use of the Walcott lathes, computed in accordance with the conclusions here adopted, are shown on Schedule C attached to this report and are as follows: Model T, $42,700.76; Model A, $98,675.15; Tractor, $65,448.31; total for all shafts, $206,824.22.

(3) Offset of Loss From Scrapping Shapers.

The question may be raised as to whether the unrecovered cost of the shapers scrapped by defendant after adoption of the Walcotts and the payment of approximately $20,000 on new shaper orders cancelled in 1924 should be offset against the savings found to result from the infringing machines. While defendant raised this point at one time during the trial, neither party has given any effect to it in its accounts. No doubt when a company purchases a new machine, it expects to save enough with it to make up for any loss in scrapping the one it replaced. If it did not make such saving, it would feel that it had made a bad

investment. However, I know of no case which has considered this factor in determining profits from the use of a machine; and it hardly seems proper to say that a scrap loss on a former machine constitutes a cost of the machine which replaces it. In this case, moreover, infringement did not commence until more than a year after the installation of the Walcotts, by which time eleven of the seventeen shapers had been scrapped and the $20,000 payment long since made. It might equally well be argued that since if defendant had turned to the shapers in 1925 instead of infringing it would have had to dispose of its comparatively new Walcott machines as well as buy new shapers, the loss which would have resulted from disposing of the Walcotts should be added to the cost of using the shapers as a standard of comparison. Under all the circumstances, I think it best to follow the method adopted by the parties and disregard any losses in scrapping machinery used prior to infringement.

3. Apportionment of Profits.

Thus far, the inquiry has been restricted to the question of the savings resulting to the defendant from the use of the infringing machines. The question now arises as to whether the plaintiff is entitled to all of those profits or whether some of them are not attributable to other elements in the machine beside the plaintiff's invention, which plaintiff cannot recover. The defendant claims that the profits must be apportioned between those attributable to plaintiff's invention and those resulting from patented improvements incorporated in the infringing machines; and that, if this is done, it will be found that all of the profits resulted from the improvements, and that plaintiff can as a consequence recover none of them. Plaintiff, on the other hand, claims that the rule of apportionment does not apply to a case where (as is claimed to be the situation here) the plaintiff's patent is on a unitary device and the claims of the patent cover the improvements added by the defendant; that it is therefore entitled to all the profits.

The question of apportionment arises in practically every patent accounting case and is probably the most difficult one with which the courts must deal. It was recognized early by the Supreme Court in *Seymour v. McCor-*

mick, 16 How. 480, 14 L. Ed. 1024 (1853), where the plaintiff's patent was for an improved driver's seat upon a reaper, that it would be unfair to permit the plaintiff to recover damages equivalent to those which would have been assessed if its patent had been upon the entire machine; and consequently the court restricted the plaintiff to those damages it could prove were attributable to the seat improvement. The same doctrine was later applied to the recovery of profits, in connection with which the problem of apportionment has more frequently arisen. In explaining the basis of the doctrine in *Sheldon v. Metro-Goldwyn Pictures Corp.*, the Supreme Court said that profits are awarded to the patentee "in accordance with the principles governing equity jurisdiction, not to inflict punishment but to prevent an unjust enrichment by allowing injured complainants to claim 'that which, *ex acquo et bone*, is theirs, and nothing beyond this'." The patentee is entitled to reap the full value of his invention, but not that which results from things outside the scope of his patent. The question of apportionment can arise under a variety of different fact situations: the patent involved may be on a machine, process or article; the infringement may be by sale or use of the patented thing; and the question may be one of recovery of profits or of damages. However, it appears that the same fundamental principles are applied to each type of case.

In each case involving the question of apportionment of profits, it is necessary to consider two issues: first, whether the defendant under the circumstances of the case has a right to have the profits apportioned; and, second, if so, how much of the profits are attributable to plaintiff's invention and how much to the other factors upon which the right to apportionment is based. This case presents a very close question on the first issue of the right to apportionment. The underlying facts on this issue are reasonably clear, and may be summarized as follows:

1. The Gordon machine itself was impracticable for machining the Ford camshafts. This is shown by the experience of Ford and of the International Harvester Company with the machine, and has been found as a fact by the Court of Appeals. In plants where the Gordon machine was successfully employed, it appears that the cams were of a more blunt-nosed type than those of defendant.

2. The Walcott machine had two improvements over the Gordon machine devised by its designer, Melling, upon which he obtained patents subsequent to the issue of the Gordon patent. The change in the method of tilting the tool, while held by the Court of Appeals to involve merely the substitution of mechanical equivalents for the means used by Gordon, was also recognized by the court as a valuable improvement which might be patentable; and a patent was later issued to Melling in his machine.

The second patented improvement consisted of a mechanism for advancing the tools to take a second finishing cut on the cams without removing the shaft from the machine; whereas, in contrast, some companies using the Gordon machine put the shaft through a second machine for a finishing cut. While it appears that devices for automatically taking two cuts upon a lathe are old, no evidence has been introduced to show that there was not patentable novelty in Melling's device. Defendant claims that this improvement, unlike the other one, was wholly outside the scope of the Gordon patent. However, it would seem that the element in Claim 2 of the Gordon patent, as an example, "means for simultaneously causing relative movement between the work holder and tool holder axially with relation to the work holder," covers the means for doing this equally whether one or two cuts are taken.

It seems clear that without these two improvements no savings would have been realized by the defendant, at least by comparison with the shaper. In the absence of evidence or argument to the contrary, it must also be assumed that the patents upon them were valid.

3. On the other hand, the Gordon invention was also necessary to the functioning of the Walcott lathe in cutting the cams (assuming, as I have found, that the non-tilting Walcott lathe is infringing). Without the basic Gordon idea of oscillating the tools to maintain proper cutting angles, the Walcott machine would be only an ordinary lathe.

All through the authorities on apportionment, a distinction is made between cases where the plaintiff's patent is for an improvement narrow in scope or covering only a part of the article on which it was used, and those where the plaintiff's patent is a basic one on a complete structure.

Egry v. Standard Register Co., 23 F. (2d) 438 (C. C. A. 6, 1928); *Yeserba v. Hardesty Manufacturing Co.*, 166 Fed. 120 (C. C. A. 6, 1908); *Stromberg Motor Devices Co. v. Zenith-Detroit Corp.*, 73 F. (2d) 62 (C. C. A. 2, 1934); *Herman v. Youngstown Car Manufacturing Co.*, 216 Fed. 604 (C. C. A. 6, 1914); *Cincinnati Car Co. v. New York Rapid Transit Corp.*, 66 F. (2d) 592 (C. C. A. 2, 1933); *Westinghouse Co. v. Wagner Electric Co.*, 225 U. S. 604, 56 L. Ed. 1222 (1912); *Dowagiac v. Minnesota Plow Co.*, 235 U. S. 641, 59 L. Ed. 398 (1915). In the former type of case, the courts hold the profits must be apportioned between the contribution of the invention and the unpatented or prior art features. Examples are the patented driver's seat on the harvester (*Seymour v. McCormick, supra*), and the patented clamp on a mop (*Garretson v. Clark*, 111 U. S. 120, 28 L. Ed. 371, 1884). In the cases of the latter type, it is generally held that the patentee is entitled to all the profits, unless the infringer has made additions or improvements, in which case under certain conditions in controversy here an apportionment will be made. See *Westinghouse v. Wagner, supra*; *Elizabeth v. Pavement Co.*, 97 U. S. 142, 24 L. Ed. 1000 (1878); *Hurlburt v. Schillinger*, 130 U. S. 456, 32 L. Ed. 1011 (1889); *Yeserba v. Hardesty, supra*; *Stearns-Roger v. Ruth, infra*; *Stromberg Motor Devices v. Zenith-Detroit Corp., supra*; *Dunn Manufacturing Co. v. Standard Computing Scale Co.*, 204 Fed. 617 (C. C. A. 6, 1913). As will be seen, the distinction between the two types of cases is especially important on the question of burden of proof. The determination of the class into which a particular case falls is not always an easy matter, there being no simple decisive test. See *Stearns-Roger Manufacturing Co. v. Ruth*, 87 F. (2d) 35 (C. C. A. 10, 1936). The classification does not depend upon the language used by the patentee in his claims, for, as was said by *Egry v. Standard Register Co., supra* (p. 440):

> "He cannot, by the language which his claim happens to take, transform his invention of an improvement in an existing structure into one of a complete structure, as if it were wholly new, so as to entitle him to profits upon those parts of it which are not in any fair sense his invention."

The test most commonly applied is that of whether if the patented features are abstracted a complete or workable article or machine is left, but this test is not universally applicable. *Cincinnati Car Co. v. New York Rapid Transit Corp., supra*; *Herman v. Youngstown, supra.* However, in the present case there would seem to be no doubt but that in view of the holding of the Court of Appeals that the patent in suit was a pioneer patent upon a machine for turning cams, the invention is one like that in the *Westinghouse* case which permeates the whole device so that the patent covers the article as a whole. The case consequently falls in the second class.

With either type of case, where it appears that the entire market value of the infringing article is attributable to the patented invention, the patentee is entitled to all the profits. *Crosby Steam Gage & Valve Co. v. Consolidated Safety Valve Co.*, 141 U. S. 441, 35 L. Ed. 809 (1891); *Elizabeth v. Pavement Co., supra.*

A third type of apportionment case which should be mentioned here is that in which the claim of apportionment is based not upon changes by the defendant in the thing patented, but rather upon improvements in machines or methods of manufacturing a product patented to the plaintiff. In such cases, it has been held that even though the improvements were patented and resulted in substantial savings in cost of production, there is no basis for apportionment. *Duplate v. Triplex, supra*; *Conroy v. Pennsylvania Manufacturing Co.*, 199 Fed. 427 (C. C. A. 3, 1912); Cf. *Carborundum Co. v. Electric Smelting & Aluminum Co.*, 203 Fed. 976 (C. C. A. 1913). The reason for this rule is not entirely clear, but the courts treat the case as being similar to that in which an apportionment based upon savings in cost of production resulting from the superior skill of the infringer is denied (*Lawther v. Hamilton*, 64 Fed. 221, C. C., Wis., 1892).

The question here resolves itself into one of when improvements added by defendant to the plaintiff's patented article will afford a basis for apportionment. *Westinghouse v. Wagner, supra*, which undertook to summarize the law on apportionment and which is the leading case on the subject, was that type of case. There, the plaintiff had a combination patent on a transformer containing open

spaces in the core to cool the mechanism. The defendant infringed by manufacturing and selling a transformer with open spaces in the core but with a reorganization of the elements to include open spaces in the coil and between the coil and core. The Supreme Court in its opinion stated four basic rules of apportionment, two of which should be quoted here.

> "(c) Where profits are made by the use of an article patented as an entirety, the infringer is liable for all the profits unless he can show—and the burden is on him to show—that a portion of them is the result of some other thing used by him. *Elizabeth v. Pavement Co.*, 97 U. S. 126.
>
> "(d) But there are many cases in which the plaintiff's patent is only a part of the machine and creates only a part of the profits. His invention may have been used in combination with valuable improvements made, or other patents appropriated by the infringer, and each may have jointly, but unequally, contributed to the profits. In such case, if plaintiff's patent only created a part of the profits, he is only entitled to recover that part of the net gains."

The Supreme Court, accepting the findings of the lower court that the spaces added by defendant were valuable and noninfringing improvements (although not shown to have been patented), held that the case was one for apportionment, apparently considering the case as coming under Rule (d), *supra*.

Plaintiff claims that the *Westinghouse* case is distinguishable from the case at bar, because the improvements here are within the inhibited field of its patent, the principal one having been adjudicated infringing. It is claimed that this falls under Rule (c) rather than Rule (d) of the *Westinghouse* case, and that the "some other thing" referred to in Rule (c) means something outside the scope of the patent claims. It is somewhat difficult to see the distinction between Rules (c) and (d) under plaintiff's interpretation, and also to distinguish this case from the *Westinghouse* case on their facts. However, the cases can be distinguished on the basis of the findings of the court in the *Westinghouse* case that the improvements were non-

infringing, while here the improvements were infringing. The *Westinghouse* case can be considered to stand for the rule that when the improvements of defendant contributing to the profits are non-infringing an apportionment will be made. The same holding was made in *Tuttle v. Claflin*, 76 Fed. 227 (C. C. A. 2, 1896), as to a non-patented heating mechanism added by defendant to the infringing machine.

The issue therefore can be further limited to the question of when, if at all, infringing improvements can be a basis for apportionment. This, in turn, can be subdivided into the case of infringing improvements which are themselves patented and of those which are non-patented. As to the latter, the authorities seem clear that there is no right to apportion: in *Clark v. Johnson*, 199 Fed. 116 (C. C. A. 7, 1912), where porcelain was substituted for metal in a dental spittoon infringing plaintiff's patent and in *Tuttle v. Claflin, supra* (where a different feeding mechanism was substituted by defendant in an infringing machine), it was held that the substitution by defendant of these mechanical equivalents (which it does not appear were patented) for the means described in plaintiff's patent affords no basis of apportionment, even though the substitution was largely responsible for the profits.

In the case of the patented improvement which is dominated by the plaintiff's patent, the law is not so clear. Apart from its argument based on Rule (c) of the *Westinghouse* case, plaintiff relies principally on this issue upon *Christensen v. National Brake & Electric Co.*, 10 F. (2d) 856 (D. C., Wis., 1924); *Flat Slab Co. v. Turner*, 285 Fed. 257 (C. C. A. 8, 1922); *Tuttle v. Claflin, supra*; and *Duplate v. Triplex, supra.* The only one of these which seems directly in point is the *Christensen* case, where the court held that improvements within the inhibited field of the patent, either as a whole or respecting any part of the structure, do not constitute a ground for apportionment, even if patented and no matter how much they promote the commercial favor of the structure, since the infringer is still exercising the patentee's rights. In the *Flat Slab* and *Tuttle* cases, certain alleged improvements were rejected as a basis of apportionment on the ground that they were merely mechanical equivalents of the patented construction. But it does not appear in either case that the equivalents in question

were patented (although the defendant in the *Tuttle* case contended that its improvement required invention to produce); so the cases are not precisely in point. The *Duplate* case is applied here by analogy, plaintiff claiming that there is no substantial difference between the case where the defendant appropriates the plaintiff's patent bodily but makes improvements in production processes, and that where it makes improvements within the scope of the patent in the patented thing itself.

Defendant, on the other hand, relies principally upon *Mason v. Graham*, 90 U. S. 261, 23 L. Ed. 86 (1875), in support of its position on this issue. In that case, defendant sold infringing pickerstaff motions for looms, but made them according to a pattern of his own devising, which was patented and which reduced their cost of manufacture. The court held that the saving in manufacturing cost should be deducted from the profits. Although this case is rather old and is rarely cited on the question of apportionment, it seems to be in point here; and, if followed, requires a decision in favor of defendant on the issue. Plaintiff contends that *Mason v. Graham* was impliedly overruled by the *Duplate* case, *supra*; but it seems clear that the *Mason* case involved an improvement in the patented thing itself rather than in methods of production of the thing (see lower court opinion, Fed. Cas. No. 5672), so there is at least a technical distinction between the two cases. Nor do I follow plaintiff's attempted distinction of this case on the ground that the infringement there was one of making and selling instead of use: the *Westinghouse* case was also one where the infringement was by making and selling. Another case relied on by defendant, *Keystone v. Adams*, 151 U. S. 139, 38 L. Ed. 103 (1894), does not seem to be in point with respect to anything that was actually decided. *Dunn v. Standard, supra*, in this Circuit, however, seems in line with *Mason v. Graham*: there, the defendant added a patented improvement to plaintiff's machine, which was apparently covered by the claims of the patent on the latter; but the court granted apportionment saying that the question of apportionment could not depend on the largely fortuitous language of the claims.

Approaching the issue here from the standpoint of principle, there is to be considered the factor pointed out

by defendant that plaintiff could not lawfully have sold the defendant machines like the infringing ones without obtaining the Melling patent rights; and, further, that if defendant had infringed both Gordon and Melling patents, it would, under plaintiff's conception of the law, have been subjected to a double liability. (Of course, the same point could be made in a case like the *Duplate* one, where the Supreme Court denied an apportionment.) On the other hand, there is a practical danger in recognizing apportionment in a case of this type, in that it may cause the accounting proceeding to go off too far on collateral issues as to the validity of a variety of improvement patents, since an infringing improvement which is the subject of an invalid patent could hardly be a basis for apportionment.

Thus, the authoritative cases seem to point to conflicting conclusions on the issue of the right to apportionment in this case, although there is perhaps a slight edge on defendant's side in those most closely in point. While, however, I have considered the law applicable to that issue at some length, I do not think that it is necessary here to finally decide it, since I am of the opinion that whichever way it is decided will not affect the result. Even if the right of apportionment is recognized, it is still necessary to separate the profits attributable to plaintiff's patented invention from those attributable to defendant's improvements, and the question arises whether on this record and under the law governing burden of proof that can be done.

The question of burden of proof is important on the issue of separation, because of the frequent impossibility of showing a reasonable basis of allocating the profits to the two factors. In recognition of that fact, the law as to burden of proof represents to a large extent a compromise between the desire of the courts not to turn the patentee down without any recovery, where it was obvious that the defendant had benefited greatly from appropriation of his invention, nor to penalize the infringer by charging him with all the profits when the plaintiff's invention was responsible for only a small part of them. In the *Westinghouse* case, which considered at great length the rules as to burden of proof, it was held that once the plaintiff has satisfied the initial burden of proving infringement and profits from the sale or use of infringing machines, the burden devolves

upon the defendant to show that something other than plaintiff's invention has contributed the profits. Upon that showing, the burden returns to plaintiff to make the separation between the profits attributable to the invention and the other thing, unless an apportionment is shown to be impossible, in which case the burden shifts back to defendant, since his act of commingling the original invention with the improvements was responsible for the impossibility. The rule is rather unusual, since the ordinary result of inability of one bearing the burden of proof to carry it is loss of the issue, while here the shifting of the burden means that the one on whom the burden rests to make the apportionment prevails unless the other side produces countervailing evidence. There is an indication of doubt in some of the cases as to whether the burden of apportionment in the *Westinghouse* case was actually imposed on the patentee at all. See *Egry v. Standard Register Co., supra*; *Cincinnati Car Co. v. New York Rapid Transit Corp., supra.*

The interpretation which has been placed on the *Westinghouse* case and the later Supreme Court decision in *Dowagiac v. Minnesota, supra,* by the Court of Appeals of this and the Second Circuit, seems to be that in cases where the plaintiff's patent is for an improvement the burden of allocating the profits between the invention and the other features is on the plaintiff; in cases where the patent is upon an entire article, it is on defendant. *Egry v. Standard Register Co., supra*; *Cincinnati Car Co. v. New York Rapid Transit Corp., supra*; *Stromberg Motor Devices Co. v. Zenith-Detroit Corp., supra*; *Columbia Machine Corp. v. Adriance Machine Works,* 79 F. (2d) 16 (C. C. A. 2, 1935); *Christensen v. National Brake & Electric Co., supra* (D. C., Wis.). (Cf. *Flat Slab Co. v. Turner, supra,* where the burden of separation was placed on the infringer as to one of his alleged improvements; and *Standard Co. v. Cropp Co.,* 6 F. (2d) 447, C. C. A. 7, 1925, and *Levin v. Davis, supra,* where the burden was put on the infringer after impossibility of apportionment had been shown.) Under these authorities, the burden of separation in this case is upon the infringer; and under any of the authorities it is upon the infringer where impossibility of apportionment appears.

The plaintiff submitted no evidence to separate the respective contribution of the two patents, relying upon its

legal contention that the doctrine of apportionment is not applicable here. Defendant's evidence on the issue consisted almost wholly of expert testimony that, since the Gordon machine was not operable on the Ford camshaft, 100% of the value of the infringing machine to defendant was attributable to the Melling improvements. This does not seem to me to be a sound conclusion. The reasoning would lead to the result that if the defendant had infringed the Melling as well as the Gordon patents, it would not be liable to either patentee, since in each case it could say that the infringed invention without the other was worthless. Liability would thus be defeated where the union of two inventions was necessary to the making of profits; yet, apart from infringement, defendant could not accomplish that end, since it would have to pay both patent owners for the rights to the machine. The error in this reasoning is that it confuses the whole with one of its parts; it evades the problem, as expressed in the *Cincinnati Car* case, *supra* (p. 594), "quantitatively to allocate the joint product of two factors, each a condition to the result."

Is there, then, any method by which an apportionment can be made on this record? The cases recognize the difficulty of making an exact apportionment, and hold that mathematical exactitude is not required but a division based upon the structural relationship between the patented parts and the nonpatented parts or improvements, or upon some other logical basis giving a reasonable approximation, can be made. *Westinghouse* case, *supra*; *Dowagiac* case, *supra*; and other cases. However, we do not have here any "helpful opinion" as referred to in *Herman v. Youngstown, supra* (p. 608), to aid the court in making the apportionment. The only possible way that an apportionment can be made on this record is for the court to make an arbitrary apportionment based upon its own judgment: to say, for example, that since the Gordon patent was the basic one, and since Gordon could (and did) carry on a business without Walcott, while Walcott could not do so without Gordon, two-thirds of the profits should be attributed to the Gordon invention and one-third to the Melling improvements. A solution of this sort was reached in *Wetherill v. Parsaic Zinc Co.*, Fed. Cas. No. 17,464; but, while this might seem a practical result, I do not think it meets the requirements of

most of the cases for proof of apportionment. The situation here is similar to that in *Egry v. Standard Register Co., supra,* in this circuit, where the court held that the record showed no reasonable basis of apportionment. The *Egry* case was of the type involving an improvement patent, so that the plaintiff was not permitted to recover any profits. This case is of the other type, and the impossibility of separating the profits sufficiently appears to impose the burden on defendant. Resorting to the books of the defendant would be of no assistance on the issue; the confusion is not related to the books at all. Consequently I conclude that the plaintiff is entitled to all the profits; as between that alternative and allowing the plaintiff none, that is the fairer result.

V. DAMAGES: REASONABLE ROYALTY.

Under the Patent Act, the plaintiff is entitled to recover damages as well as profits in an equity case. Plaintiff cannot recover here on the basis of lost profits, which is the primary method of measuring damages. There was no proof of lost sales here. The question therefore becomes one of determining a reasonable royalty, which the order of reference directs me to compute. This basis of damages has been increasingly used in recent years, since it is usually not possible to prove lost profits with the degree of certainty required by the courts and, since there is often no established royalty, an alternative basis of damages.

The reasonable royalty rule was developed by the courts as a means of compensating the patentee, where damages or profits could not be satisfactorily proved by other methods; and was subsequently incorporated in the Patent Act (35 U. S. C. A. Sec. 70). The principles which govern the determination of a reasonable royalty should be reviewed at the outset.

The courts have substantially agreed upon the definition of a reasonable royalty as being that payment for a license for the patent which would have been agreed upon at the time of infringement by reasonably prudent men in the position of plaintiff and defendant, acting without compulsion and assuming the patent to be valid. *Reynolds v. L. A. Young,* 101 F. (2d) 257, 261 (C. C. A. 6, 1939);

Goodyear v. Overman, 95 F. (2d) 978, 984 (C. C. A. 6, 1937); *Egry v. Standard, supra*, and many other cases. The evidence which may be considered in fixing a reasonable royalty is quite diversified. Primarily, the evidence to be considered is that of "the nature of the invention, its utility and advantages, and the extent of the use involved." *Dowagiac v. Minnesota, supra*; cf. *General Motors v. Blackmore*, 53 F. (2d) 725, 729 (C. C. A. 6, 1931), and *Horvath v. McCord, supra*, page 335. The opinion testimony of experts is always admissible, as well as evidence of business practice and royalties in related fields. *U. S. Frumentum v. Lauhoff*, 216 Fed. 610 (C. C. A. 6, 1914). Isolated royalty contracts made by the patentee with others for the rights to the invention are admissible, although the court will weigh the circumstances under which they were made and the reasonable royalty assessed may be more or less than that provided in such contracts, the infringer not being entitled to the depressed rate to which the patentee may have been driven by open defiance of his patent. *General Motors v. Blackmore, supra; Horvath v. McCord, supra; Dunkley v. Central California Canneries, supra; Austin-Western Co. v. Disc Co.*, 291 Fed. 301 (C. C. A. 8, 1923). The amount of profits, or lack of them, realized by defendant from infringement is material; but the mere fact that no profits have been made does not prevent the award of a reasonable royalty. *National Tube v. Mark, supra; Reynolds v. Young, supra*; *Dunkley v. California Canneries, supra*; *Malleable Iron Range v. Lee*, 263 Fed. 896 (C. C. A. 7, 1920). It is the expectable profit at the time the suppositious royalty contract was made, rather than the actual profit, which is important.

The royalty should be fixed at such figure as to leave room for an expected manufacturing profit in the licensee. *Rockwood v. General Fire Extinguisher Co.*, 37 F. (2d) 62, 66 (C. C. A. 2, 1930); *Consolidated Rubber Co. v. Diamond Rubber Co.*, 226 Fed. 455, affirmed 232 Fed. 475 (D. C., N. Y., 1916). With this method of fixing damages, it is unnecessary to show that the sales or purchases made by defendant would have been made by plaintiff if there had been no infringement. *Consolidated Rubber Co. v. Diamond Rubber Co., supra*; *Dunkley v. California Canneries, supra*. The reasonable royalty method applied to cases

where the infringement has been one of use, as well as where it was one of sale of the patented thing, although the measure of royalty will usually differ in the two types of cases. *Horvath v. McCord, supra*; *Dunkley v. California Canneries, supra; Gear-Grinding Machine Co. v. Studebaker Corp.*, 4 F. (2d) 510 (C. C. A. 6, 1925); *Muther v. United Shoe Machinery Co.*, 21 F. (2d) 773 (D. C., Mass., 1927). It has been said that a reasonable royalty should be computed upon a conservative basis, and that it should not be so high as to induce patentees to countenance infringement nor so low as to encourage infringement. *Consolidated Rubber v. Diamond Rubber, supra.*

In the case at bar, the plaintiff claims that it has suffered damages of various kinds from the defendant's infringement, which, however, cannot be calculated with reasonable certainty; and that the evidence supports the award to it of a royalty of at least six cents per camshaft turned on the infringing machines. Defendant, on the other hand, claims that the statutory conditions to the award of a reasonable royalty are not satisfied here; that if any royalty can be allowed it cannot be based upon the production of the infringing machines; that a royalty of ten per cent of the selling price of the Gordon machine was established by the plaintiff, which precludes the assessment of a different reasonable royalty, but that even the established ten per cent royalty can be collected only from the manufacturer and not from a user of the infringing machines. I will consider the issues arising from these claims in order.

A. CONDITIONS TO ASSESSMENT OF REASONABLE ROYALTY.

Defendant contends that under the statute a reasonable royalty can be assessed only when neither profits nor damages can be calculated with reasonable certainty, and that since both sides agree that profits can here be calculated with reasonable certainty, there is no occasion for resorting to the royalty method of compensation. There was a holding to that effect in the case of *Krentler-Arnold Co. v. Leman*, 24 F. (2d) 423 (D. C., Mass., 1928). However, it is clearly not the law in this Circuit, as is seen from the case of *Goodyear v. Overman*, 95 F. (2) 978 (C. C. A.

6, 1937), where the court found the profits of the defendant to be $29,221.97, and yet held that if the defendant desired a reasonable royalty the case would be remanded for further proceedings to determine it. In several cases, cited above, the courts have found the profits of defendant from infringement to be clearly zero; and yet despite the reasonable certainty in their calculation have made an award of a reasonable royalty. The statute is worded in the alternative, so that if either damages or profits cannot be calculated with reasonable certainty, the court can order the payment of a reasonable sum as profits or general damages.

The second ground on which defendant claims the conditions to the award of a reasonable royalty have not been satisfied is that the existence of damages to the plaintiff or unjust enrichment of the defendant—a statutory condition as well as a requirement of the case law on reasonable property—has not been shown. Defendant claims that its infringement caused no damage to plaintiff because it was not in competition with the Gordon Company and it would not have bought the latter's machines, even if it had not infringed, since they were inoperable to cut its cams. However, it does not follow that because the Gordon machine in its patented form would not have been purchased by Ford that plaintiff has suffered no damage. There is no reason to suppose that if defendant and others had not infringed plaintiff's patent the plaintiff and the Walcott Company would not have reached an agreement under which the cam-turning lathes with the Walcott improvements would have been supplied to the trade, with each company sharing in the proceeds. Since the plaintiff's pioneer patent was primarily responsible for the value of the Walcott machine, the probability exists that defendant's infringement caused substantial damage to plaintiff, which, however, it is obviously impossible to gauge with accuracy. Thus, not only unjust enrichment by defendant, which has already been found, but the probability of substantial damages exists here.

B. AMOUNT OF ROYALTY.

I come then directly to the question of the amount at which the royalty should be fixed. The facts as to the nature, utility, and advantages of the plaintiff's invention

and the extent of use by the defendant, and as to the savings realized by defendant by its infringement need not be repeated here. The plaintiff sold its machines for an outright cash consideration and neither it nor the Walcott Company attempted to collect a royalty on products from the purchasers. On each machine sold by plaintiff, the plaintiff paid to Gordon's company, the Production Machine Tool Company, a royalty of 10% of the purchase price. The specific evidence submitted on the question of reasonable royalty centers largely around settlement agreements entered into in 1929 and 1930 between the plaintiff and certain infringers. After the decision of the Circuit Court of Appeals in 1929 in the *Walcott* case in its favor, the plaintiff made an offer to practically every automotive company (including defendant) to release all claims against infringers on the basis of ¾ of a cent per cam turned on the infringing machines for past production, and $4,000 per machine for future production. Pursuant to this proposal, contracts were made with plaintiff by the White and Case Motor Companies for an amount equal to ¾ of a cent per cam (a total of $2,465.92 being paid by White and $1,055.28 by Case). At about the same time, separate contracts were entered into with plaintiff by White and Case, and also by the Chrysler and Nash companies, for licenses for future production on their infringing machines, at the rate of $2,000 for each machine used on four cylinder shafts and $3,000 for each machine used on six cylinder shafts. The total amount paid by all four companies for a release of the Gordon patent rights for the future was $66,000. However, in 1930, a settlement was negotiated by the General Motors Company on behalf of all members of the National Automobile Chamber of Commerce for a complete release of the plaintiff's claims for past and future infringement against all members, which superseded the previous settlements. In this deal, General Motors paid the plaintiff the sum of $195,000 (as against an original request by plaintiff for $1,250,000), in addition to the sums already paid by other companies, which the plaintiff was allowed to retain, making a total of $264,521.20. It appears that the General Motors payment was a lump sum settlement and not based upon production of cams; but the settlement price was subsequently apportioned among the various members of the Chamber of Com-

merce on the basis of their production of cams on the infringing machines. In this apportionment, refunds were made to the White and Case Companies for the amount paid by them in excess of their share, the amount repaid to the White Company being $3,705.92. The records which the witness from the General Motors Corporation had with him indicated that approximately 160,000,000 cams had been turned upon machines of infringers involved in the settlement, which makes the payment average approximately 1/7 of a cent per cam for past infringement alone, and considerably less if future production on the machines is considered.

Additional evidence submitted by plaintiff on this question includes testimony of production engineers of the White and Nash automobile companies that each company saved approximately thirty cents per shaft by the use of the Walcott machines in place of the old grinding method (the Nash shaft, however, having twelve cams), and the testimony of the White witness that the company paid a royalty of ten cents per shaft for machinery for grinding spline shafts with savings approximately the same as with the Walcott machines, and that in his opinion ten cents a shaft would be a fair royalty for the use of the latter.

Specific evidence submitted by defendant on the question of reasonable royalty was confined largely to the testimony of two witnesses familiar with sales practices in the machine tool industry that to their knowledge no production machine was ever sold in that industry on the basis of payment of a certain amount per piece for work produced upon it. The testimony of Brush that the Gordon invention was of no value to Ford was also submitted as evidence that no substantial payment for the use of the invention could be reasonable.

The most critical question in determining a reasonable royalty here relates to the basis to be adopted in fixing it. While it has been said that in fixing such a royalty the basis is not important if the amount is fair (*Motor Player Corp. v. Piano Motors Corp.*, 19 F. (2d) 993, 996, D. C., N. J., 1927), it seems obvious here, in view of the tremendous production of the defendant, that a royalty based upon production will probably result in a much greater recovery than a royalty based upon an outright payment

for each machine or a percentage of the selling price. There is comparatively little general discussion in the cases concerning the base to be used in fixing reasonable royalties, each case being dealt with by the courts on its own facts. An examination of the many cases dealing with royalty payments for patent rights (collected in Zabel, *The Patent Royalty Contract*) discloses that practically every conceivable basis has been used at one time or another in royalty contracts. This is not surprising, since the problem will vary with the type of patent involved, its economic importance, the use to which the licensee intends to put it, and many other factors, and since, moreover, in like situations reasonable men will differ as to the base to be used.

The problem of fixing a royalty for the manufacture and sale of a patented thing must be distinguished from that where a machine or process is involved. With the former, it seems to be most common to set the royalty on the basis of a fixed amount for each articulation of the patent or a fixed percentage of the selling price or manufacturing cost. *Reynolds Spring Co. v. L. A. Young Industries,* 101 F. (2d) 257 (C. C. A. 6, 1929); *Clark v. Schieble,* 248 Fed. 276 (C. C. A. 6, 1917); *Godwin v. International Steel Tie Co.,* 29 F. (2d) 476; *Motor Player Corp. v. Piano Motor Corp., supra.* Where the infringement has involved the use of a patented machine, royalties have frequently been assessed on the basis of production on the machine. *Gear Grinding Machine Co. v. Studebaker Corp.,* 4 F. (2d) 510 (C. C. A. 6, 1925); *Dunkley v. California Canneries, supra.* (See also *Empire v. DeLaski, supra,* and *Paper-Bag Machine* cases, 105 U. S. 766, 26 L. Ed. 959, 1882, which were cases of established royalties; and *Muther v. United Shoe Machinery Co.,* 21 F. (2d) 773, D. C., Mass., 1927.) This is not surprising, since the benefit to the user of patented machinery lies in its saving in production costs, and if the saving is great enough and the machine cannot otherwise be obtained, the user will find it to his advantage to pay a royalty based upon output. However, royalties for the use of machines have been fixed on many other bases, including periods of time (see *Burr v. Duryee,* 68 U. S. 531, 17 L. Ed. 650, 1863, and *Diamond Stone Sawing Machine Co. v. Brown,* 155 Fed. 753, C. C., N. Y., 1907, established

royalty cases), and a lump sum payment (*National Tube v. Mark, supra*).

The chief evidence in support of the production base for the reasonable royalty in this case is that of the settlement contracts negotiated by plaintiff with various automotive companies, chiefly White and Case. This leads to the question of the competence of this evidence to show such royalty. This question was considered in *Rude v. Westcott,* 130 U. S. 152, 164, 32 L. Ed. 888 (1889), where the Supreme Court rejected, as proof of an established royalty, evidence of contracts in settlement of past infringement, the Court saying:

> "It is clear that a payment of any sum in settlement of a claim for an alleged infringement cannot be taken as a standard to measure the value of the improvements patented, in determining the damages sustained by the owners of the patent in other cases of infringement. Many considerations other than the value of the improvements patented may induce the payment in such cases. The avoidance of the risk and expense of litigation will always be a potential motive for a settlement."

While this decision antedates the development of the reasonable royalty doctrine, the same ruling was made by the Court of Appeals of this Circuit in *General Motors Corp. v. Blackmore,* 53 F. (2d) 725, 729 (1931). A good argument has been made in favor of the admissibility of such evidence, *Cincinnati Car Co. v. New York Rapid Transit Corp., supra*; and in *Gear Grinding v. Studebaker, supra,* in this Circuit, royalty contracts based in part upon settlement were considered in fixing a reasonable royalty. However, under the *Blackmore* case, *supra,* the law is established in this Circuit that contracts in settlement of a past infringement alone are not competent to prove a reasonable royalty. (To the same effect, see *Dunkley v. California Canneries, supra.*)

There is, however, one group of settlement contracts between plaintiff and alleged infringers in 1929 and 1930 which does not come within the prohibition of *Rude v. Westcott*: namely, the contracts for the Gordon patent rights for future use of the Walcott machines. Since the paying parties to those contracts had the same free choice

as any licensee to pay royalties or refrain from using the machines and incur no liability to the patentee, the factors which have caused the courts to exclude contracts in settlement of past infringement are not present in the case of the contracts for the future. While the facts that refunds were later made to some of the parties to those contracts and that the contracts contained provisions barring their use in future litigation between the parties may affect the weight to be accorded them, the fact remains that the payments stipulated were made in the first instance and they consequently have some bearing on the question of reasonable royalty.

In view of the fact that the plaintiff never attempted to sell its machines for a royalty based upon output and that even in 1929 after its manufacturing activity had been terminated it did not attempt to collect such royalties for future use of infringing machines, and in view of the evidence indicating that it is not the usual practice in the machine tool and automotive industries to sell production machinery on that basis, I reach the conclusion that a reasonable royalty should not be assessed here on the basis of production. It seems evident that, apart from litigation, a production royalty would never have been asked for by plaintiff or paid by defendant. The case is different from *Gear Grinding v. Studebaker, supra,* and *Horvath v. McCord, supra,* where, so far as appears from the opinions of the court, the patentee did not sell the machine outright but licensed it only for royalties based on production. On the other hand, I cannot accede to defendant's contention that ten per cent of the sales price of the infringing machines is the limit of plaintiff's royalties. Apart from the objection that two infringers should not be able to determine the royalty of a patentee by setting a selling price between themselves, the ten per cent royalty payments were made *by* plaintiff to another and not *to* the plaintiff by purchasers of its machines. Moreover, they were made in the early years when plaintiff was building up a business in the patented machine, and since Gordon had the chief financial interest in the paying company they amounted in a large measure to a transfer of money from one pocket to another. They are therefore not a conclusive guide to a reasonable royalty to be paid to plaintiff for a release of its patent rights by a user of infringing machines.

In *Horvath v. McCord, supra,* the Court said:

> "In every case, the court should sift the evidence and place its determination of reasonable royalties on something tangible if it can be found in the record in order to avoid an arbitrary conclusion."

Mathematical exactitude in fixing a royalty, however, is recognized as impossible to attain and is not required. *Malleable Iron Range Co. v. Lee,* 263 Fed. 896, 898 (C. C. A. 7, 1920). The record here shows that plaintiff requested $4,000 per machine, and Chrysler, Nash, White, and Case paid $2,000 to $3,000 per machine (depending on the number of cams in the shaft to be turned) for a release of the Gordon patent rights after 1929 and 1930, when the most valuable years of the patent had expired. It must be recognized that defendant had been using a much better machine than the other automotive companies before the adoption of the Walcotts; on the other hand, the difficulty in using that machine for Model A production can be considered in fixing a royalty in 1925 as something which potentially might happen (see *Egry v. Standard, supra,* p. 443). Furthermore, defendant's larger production, while it made it practical for it to build special production machinery, also made labor-saving machinery of relatively more value to it than to the others. Considering that most of defendant's Walcott lathes were in use for nearly five years between the issuance of the patent and the said royalty contracts for the future, I think that $5,000 per machine represents a reasonable royalty for a license of the plaintiff's patent for the use of said machines. I find, as a conclusion of fact, that the plaintiff and defendant (or reasonably prudent men in their position) would have come to an agreement to pay the said amounts at the time if defendant had recognized the Walcott machines as infringing the plaintiff's patent. The total reasonable royalty thus found for all twenty-four infringing machines amounts to $120,000.

VI. QUESTIONS OF CLEAN HANDS AND OF INCREASE OF RECOVERY.

A. CLEAN HANDS.

It is now necessary to consider two issues involving the conduct of both parties in connection with the use of the infringing machines and the effort by plaintiff to recover for the infringement. The first concerns the claim of defendant that plaintiff has not come into this court with clean hands and that it is consequently barred from any relief. While a large part of the briefs has been devoted to this issue, lengthy discussion of it in my opinion is unnecessary. The claim in essence is that plaintiff, finding itself unable to make money out of the manufacture of its machines, has attempted to make it out of litigation; and in doing so has pursued a course of conduct which would be condemned by all fair-minded men, and which culminated in an act of bribery of a potential witness to keep him from testifying. Apart from the latter, the specific charges of improper conduct made by defendant can be summarized as follows:

1. Plaintiff, with full knowledge of defendant's use of the Walcott lathes, failed to give it notice of infringement, but instead wanted the defendant to infringe.

2. After the decision of the Court of Appeals in the *Walcott* case, plaintiff, realizing that it could recover only a relatively small royalty from the Walcott Company and that such recovery would result in the machines purchased from that company being fully licensed, entered into a consent decree awarding it nominal damages, in order to be able to prosecute its claims against defendant and other infringing users. Plaintiff thereafter picked on small infringers to get settlement contracts at a high per cam rate which it could use to secure heavy royalties from the large infringers.

3. Plaintiff has submitted evidence in this and previous lawsuits which was intentionally misleading, in particular testimony of Gordon in the *Walcott* case that grinding was the universal method of roughing cams prior to his invention, the introduction of the White and Case contracts without disclosure of the refunds, and the testimony of Gordon in this case as to a purported interview with de-

fendant's Mr. Wibel in regard to notice of infringement, and his testimony with respect to Westinghouse blueprints.

Defendant relies upon no specific cases in connection with these charges, but on the general doctrine of clean hands. Much of the charges, if true, are directed at the plaintiff's strategy in enforcing its rights under the Patent Act, which, even if not in accord with the highest ethical principles, is of doubtful validity as a defense to infringement. (See *Columbia Motor Car Co. v. Duerr & Co.*, 184 Fed. 893 (C. C. A. 2, 1911).)

However, I think the charges of defendant reflecting on plaintiff's conduct are exaggerated. It is unnecessary to analyze the evidence on each of defendant's charges in detail. However, by and large, the plaintiff has taken the normal course in enforcing its patent rights. It first sued the manufacturer of the infringing machines, and after getting a decree against it sued the user of the machines. There is no evidence here to establish that the decree for nominal damages in the *Walcott* case was not based upon the financial condition of the Walcott Company, as recited in the decree. Since, according to defendant, the National Automobile Chamber of Commerce had taken over the defense of that suit, it is difficult to see why it did not object to the decree if its effect was to penalize unjustly its members who used the infringing machines; but there is no evidence here of such objection. After the Walcott decree, plaintiff extended the same settlement terms to all infringers, although it is true that the White and Case companies were the only ones to settle at the ¾ cent per cam rate. While the evidence here fails to establish actual notice of infringement to defendant prior to 1929, it shows that plaintiff made an attempt to give notice to infringers in 1925 but was unable to prove to which companies it actually sent the notices. With respect to Gordon's testimony, it may be that he was sometimes mistaken and sometimes affected by self-interest, but on the whole he was fair and candid; and he readily conceded advantages in the Walcott machine over his own. Therefore, even if a defense based on these claims of defendant can be raised at this time, I find and conclude that the defense is not substantiated by the evidence.

The more serious charge of purchase by plaintiff of the secrecy of a potential witness—one Laughlin—remains

to be considered. The evidence relied upon by defendant in support of this charge can be summarized as follows: Laughlin, who was employed by the General Motors Corporation as a patent investigator in connection with the Gordon suit against it, obtained information and physical evidence with respect to the Stoddard-Dayton machine (claimed by defendant here as an anticipation of the Gordon invention), which he communicated to counsel for General Motors. After settlement of the General Motors suit, during the negotiations for which the Stoddard-Dayton defense was brought to plaintiff's attention, plaintiff retained Laughlin, paying him a total of more than $2,700. The initial payment of $1,000 was made on November 18, 1930, the same day on which plaintiff telegraphed defendant inviting settlement. In the main trial in this case, the witness Rupple testified that a brown paper drawing of the Stoddard-Dayton machine had disappeared from the files of his company. Rupple further stated that he had talked with Laughlin in regard to the machine and had delivered to him a cam machined upon it, which he had not seen thereafter. On the accounting, Gordon was questioned by defendant's counsel as to why Laughlin was hired, but received generally indefinite answers, although Gordon did state that Laughlin told him about the Stoddard-Dayton defense. Defendant claims that the only fair inference from this evidence is that Laughlin was retained by plaintiff to suppress the evidence he had obtained concerning the Stoddard-Dayton machine, and that, under *Keystone Driller Co. v. General Excavator Co.*, 290 U. S. 240, 78 L. Ed. 293 (1933), plaintiff is barred from recovery.

In the *Keystone* case, it appeared that in a prior suit involving the patent the plaintiff had paid one Clutter to keep secret the details of a prior use by him. The Court held that this conduct barred recovery under the doctrine of clean hands, regardless of whether the prior use constituted a good defense. From the *Keystone* case it is clear that if plaintiff hired Laughlin with the understanding that he would suppress evidence concerning the Stoddard-Dayton machine, it should be barred from recovery here; and *Goodyear v. Overman*, 95 F. (2d) 978 (C. C. A. 6, 1938), does not change this conclusion. However, as with all charges of fraud, the evidence to sustain this charge

must be clear and convincing (see 27 *C. J.* 62). While direct evidence is not required, the inference of bribery must be clear.

Examining the evidence with that principle in mind, we find that it affirmatively appears that the brown paper drawing disappeared before Laughlin came on the scene: Rupple testified that he had not seen it since 1927, and that he could not find it when Laughlin came looking for information. As to the cam turned over to Laughlin, it appears that Rupple made a drawing of it which was introduced in evidence on the main trial. Defendant had several other cams allegedly turned on the Stoddard-Dayton machine which it placed in evidence. Contrary to the situation in the *Keystone* case, Laughlin was not called to testify here, and there is no reason to suppose that if called he would have testified falsely or would have refused to produce the cam. While Gordon was not entirely clear in his testimony about the reason for employing Laughlin, he did state that Laughlin had told him and his attorneys of publications relating to the prior art which they investigated. It seems quite clear under the circumstances that the alleged action of paying Laughlin to conceal evidence could not have taken place without the active participation of plaintiff's attorneys. Even if dishonesty were to be imputed to them, they can at least be credited with sufficient intelligence not to arrange to conceal evidence which had been disclosed to General Motors and which was thus likely to be exposed at any time. It might also be expected that Gordon would have a much more convincing story, which could have been readily invented, if he was guilty of the alleged action. It is a much more natural inference from the evidence that the purpose of plaintiff in employing Laughlin was to ascertain and investigate defenses which might be raised in this lawsuit. I therefore think that defendant's charge is not well-founded; and I find specifically that the evidence does not sustain a finding that plaintiff retained Laughlin on the implied condition or with the purpose of purchasing his silence in this case.

B. INCREASE OF RECOVERY.

The final controversial issue in this accounting arises out of plaintiff's claim that the reasonable royalty should be tripled, at least for such part as applied to the period

subsequent to the decision of the Circuit Court of Appeals in the *Walcott* case on April 12, 1929. In the original trial of this case, Your Honor, after an elaborate inquiry into the conduct of the defendant in this case and its policy with respect to patent rights, found it not guilty of willful infringement and provided in the decree that an increase of damages would be denied. This provision, however, was stricken from the decree by the Circuit Court of Appeals, which held that the question of increase of damages should be reserved for the accounting.

The provisions of the Patent Act authorizing the court to increase damages up to three times the original amount (35 U. S. C. A. Secs. 67 and 70) have been held in this circuit not to apply to profits; and the plaintiff here makes no claim for an increase of profits. The statute itself does not state the grounds upon which an increase of damages should be made. The rule has accordingly been developed that the decision as to increase is largely at the discretion of the trial court, although that discretion is not unlimited, being subject to appellate revision if abused. *Topliff v. Topliff*, 145 U. S. 156, 36 L. Ed. 658 (1892). The object of the statute has been stated to be primarily punishment of the infringer and deterrence of others (*Seymour v. McCormick*, 57 U. S. 480, 14 L. Ed. 1024 (1853); *National Folding Box Co. v. Robertson's Estate*, 125 Fed. 524 (1903)). However, there is also the purpose of recompensing the plaintiff for losses incurred but not recoverable under the strict rules of law, *Beacon Folding Machine Co. v. Rotary Machine Co.*, 17 F. (2d) 934 (D. C., Mass., 1927); and this is evidenced by the practice frequently adopted, where grounds for increase are found, to increase the damages by an amount sufficient to take care of the plaintiff's expenses of litigation other than recoverable court costs.

The major grounds on which damages have been increased seem to fall under three main heads: (1) willful or deliberate infringement by defendant; (2) vexatious litigation; and (3) failure to keep adequate records of the infringement. The first ground stated is the primary one recognized by the courts. *Clark v. Schieble*, 248 Fed. 276 (C. C. A. 6, 1917); *K. W. Ignition Co. v. Temco Electric Motor Co.*, 283 Fed. 873 (C. C. A. 6, 1922); and practically every other case of increased damages. The decisions generally do not attempt to define willful infringe-

ment, instead dealing with each case upon its own special facts and circumstances. Generally speaking, use or sale of the thing found infringing, with knowledge of the claim of infringement and without a good faith defense, constitutes deliberate infringement. A good faith belief in a valid defense to infringement is inconsistent with deliberate infringement. *Clark v. Schieble, supra; Creagmile v. Bean Manufacturing Co.*, 32 F. Supp. 646 (D. C., Cal., 1940); *Page Machinery Co. v. Dow, Jones & Co., supra.* Generally, a conflict in court decisions on the validity or infringement of a patent negatives willful infringement. *Goodrich Co. v. Consolidated Co.*, 251 Fed. 617 (C. C. A. 2, 1921); *Metallic Rubber Tire Co. v. Hartford Rubber Works Co.*, 275 Fed. 315 (C. C. A. 2, 1921); *Expanded Metal Co. v. General Fireproofing Co.*, 247 Fed. 899 (D. C., Ohio, 1917); but this is not necessarily so, *Godwin v. International Steel Tie Co.*, 29 F. (2d) 476 (C. C. A. 6, 1928). Advice by counsel of invalidity of plaintiff's patent or non-infringement thereof ordinarily precludes deliberate infringement, but not necessarily so. *K. W. Ignition Co. v. Temco, supra; Expanded Metal Co. v. General Fireproofing Co., supra; Malleable Iron Range Co. v. Lee*, 263 Fed. 896 (C. C. A. 7, 1920). The test of good faith is not entirely subjective; and the infringer does not have to know that he has absolutely no rights, since if he decides to litigate rather than pay, he takes the risk of the outcome to some extent. *Consolidated Co. v. Diamond Rubber Co.*, 226 Fed. 455 (D. C., N. Y., 1919).

The two other grounds for the application of the statute above stated are rarely found alone in the cases and may be considered evidence of willfulness of defendant's infringement rather than separate grounds for increase. However, under the head of vexatious litigation, the action of an infringer in prolonging litigation, in obstruction and concealment of facts on the accounting, in transferring assets to prevent satisfaction of the decree, and in failing to make a reasonable settlement with plaintiff have all been considered factors supporting an increase of damages. *National Box Co. v. Robertson, supra; Fox v. Knickerbocker Engraving Co.*, 165 Fed. 442 (C. C. A. 2, 1908); *Weston Electrical Instrument Co. v. Empire Electrical Instrument Co.*, 155 Fed. 301 (C. C., N. Y., 1907); *Parker Rustproof Co. v. Ford Motor Co.*, 23 F. (2d) 502 (D. C.,

Mich., 1928). With respect to the failure of defendant to keep or the destruction of records of the infringement, the usual penalty applied by the courts for such conduct seems to be that of resolving doubts against the defendant on questions of fact which the records would have clarified, *Westinghouse v. Wagner, supra; Computing Scale Co. v. Toledo Computing Scale Co., supra; Schoenhofen Brewing Co. v. Alvey-Ferguson Co.*, 14 F. (2d) 945 (C. C. A. 7, 1926); however, it has also been considered a basis for increasing damages, *Overman Cushion Tire Co. v. Goodyear Tire & Rubber Co.*, 66 F. (2d) 361 (C. C. A. 2, 1933); *Fox v. Knickerbocker, supra.*

Plaintiff claims that the record on the accounting presents a different picture of defendant's conduct than that before Your Honor, justifying an increase of damages now.

It is contended that Your Honor's finding that the infringement was not deliberate was based upon the conclusion that upon receipt of notice in 1929 the defendant's only practicable alternative to continuing infringement was to develop a new machine, since the testimony indicated it could not return to the shapers. On the accounting, however, the defendant claims that it would have been a simple matter to adjust the shapers to Model A production, the reason given by defendant's counsel for not doing so being that it wanted to develop a new machine superior to any theretofore used; and in the meantime it continued to use the infringing machines without making any offer to compensate the plaintiff. Plaintiff further claims that the destruction of records by defendant and obstructive tactics were responsible for the prolonged accounting. It is contended that defendant did not file a frank account, but prepared it with the intention of showing a loss, regardless of the facts, to support its contention that it does not owe plaintiff one penny. Specifically, plaintiff charges defendant with bad faith on the accounting in presenting the Ford-Westinghouse machine as a standard of comparison, despite deviations from the original and a failure to ascertain whether it would turn out a usable product; in changing its position from the main trial as to the usability of the shapers on the Model A shaft and the efficiency of the Walcott machines; in "pressure" applied to the witness Franklin; in the use of obsolete drawings of the shaper to support its claim of straightening; in charges of unethical conduct

on the part of plaintiff and its attorneys; and in other respects. Plaintiff shows that this litigation has been expensive to it, a total of $19,463.70 having been spent upon it until close to the end of its case on the accounting, which sum does not include counsel fees. It is contended by plaintiff that if defendant's conduct does not constitute willful infringement, no conduct ever does.

The most important question concerns the good faith of defendant in continuing infringement after 1929 and in compelling the plaintiff to relitigate the question of infringement, since, in my opinion, an increase of damages here, if granted at all, must be predicated upon such conduct. This is the very question which was previously passed upon by Your Honor. The facts relevant to that question, as developed in both the main trial and the accounting, should here be reviewed.

Defendant bought the first eighteen infringing machines before plaintiff's patent issued, and no knowledge of the claim of infringement has been shown until after the Court of Appeals decision in the *Walcott* case on April 12, 1929. When defendant received the notice of infringement on June 13, 1929, it had twenty-one Walcott lathes turning out its camshaft production. All of its camshaft shapers had been scrapped some time before. Defendant's first action was to contact the Walcott Company which had guaranteed it against patent infringement, and which stated it was trying to work out a deal under which it would take over the Gordon patent. These negotiations continued through November, 1929, when they collapsed. In the meantime, defendant took steps to find a non-infringing substitute to replace the Walcott machines. With this in mind, it investigated the new Walcott heads about July, 1929, but concluded they were infringing. About two months later, Pioch conceived his idea of a milling machine, and in October began experimenting with a single cutter. It was decided to build such a machine, and designs were drawn up and the machine ordered March 20, 1930, it being placed on the production line on May 13, 1930. This machine proving successful, five more were ordered on August 26, 1930, and installed between December 1930 and February 4, 1931. The last Walcotts were finally removed from cam production on March 16, 1931, nearly two years after the Court of Appeals decisions. No consideration was given by de-

fendant at any time to a return to the shapers, although, according to Pioch (D. A. R. 1152-1153), it would not have been necessary to build an initial experimental machine as with the Pioch but an entire battery could have been ordered at once. According to a statement of defendant's counsel, this was because defendant decided that since it had to shift to a new machine it would build one that would surpass all previous types; while Pioch states it never occurred to him to go back to the shaper.

During this period, defendant made no overtures to pay the plaintiff for the use of its patent. At first, it was advised by its attorney Halbert that the consensus of legal opinion was that the Gordon patent would be sustained in future litigation. Defendant was excluded at plaintiff's insistence from the General Motors settlement, because General Motors was representing the National Automobile Chamber of Commerce, of which Ford was not a member. On November 18, 1930, a telegram inviting settlement was sent to defendant; but on the advice of its present attorney, Mr. Farley, that it had a good defense to infringement, it did not reply. Shortly thereafter, plaintiff filed its bill in this case. (It appears defendant later offered plaintiff the rights to the Pioch machine in settlement of its claim.)

On this record, defendant's infringement was clearly innocent until 1929, it having no knowledge of a claim of infringement. This fact seems important also in appraising its later conduct. While a violent commencement of infringement does not seem to be essential to an increase of damages (see *Consolidated Co. v. Rubber Co., supra,* where the court held that defendant's infringement commenced innocently and later became willful), the presence or absence of this factor is important. Most of the cases of deliberate infringement are ones where the defendant began infringing after warning or with knowledge of the plaintiff's claim. When defendant learned it was using machines held infringing in 1929, it had a serious problem on its hands. If it had been notified of the infringement in 1925 and continued to use them, it would be fair to have required it to have a substitute ready upon decision of infringement.

The District Court has previously gone into the question of defendant's duty in 1929 when it found that the Walcott machines it was using had been held infringing.

It would seem that if it did not want to pay plaintiff for a release of its patent rights it was incumbent upon it to discontinue their use as soon as practicable, at the risk of having its infringement held deliberate if the court adhered to the decision of infringement. However, in view of the fact that the infringement was not of a product but of the use of one of hundreds of machines in its line of production, it would seem that it should be allowed a reasonable time to decide its course of action and secure a substitute, before its action should be held willful or wanton. I know of no case on this point, and neither side has cited any, but this conclusion seems in harmony with the general principles of the cases on deliberate infringement.

Whether defendant did act with reasonable promptness is a question of fact considered on the main trial by Your Honor. The record here is somewhat stronger against the defendant than on the main trial, because of the evidence that defendant could have returned to the shaper, and could have done so more rapidly than to develop a new machine. (It would, however, have been necessary to build new machines, which might have taken nearly as long as to develop the Pioch machines.) While nearly two years elapsed before the Walcotts were finally replaced, the fact that it spent considerable time negotiating with the Walcott Company which had given it a patent guarantee and the lack of damage to plaintiff, other than deprivation of royalties for defendant's use during this period, may be considered factors in its favor (although I cannot agree with counsel for defendant that competition between plaintiff and defendant and actual damage to plaintiff is an essential element of a case for increased damages).

In view of the lack of proof of notice or knowledge of infringement by defendant prior to 1929 and the other circumstances mentioned, I am inclined toward the view taken by the District Court that defendant's infringement should not be held willful. However, since Your Honor has previously thoroughly considered the question of the willfulness of defendant's infringement after 1929 as well as that of its good faith in compelling plaintiff to relitigate the question of infringement, I prefer not to make a positive recommendation on these questions, but rather to report the facts to the court together with the contentions on both

sides, pointing out to the court the difference in the factual picture before it and that developed from the accounting. This procedure was adopted by the master in *Muther v. United Shoe Machinery Co., supra,* and was approved by the court in that case.

Insofar, however, as the claim for increased damages is based upon defendant's practice in keeping records of the infringement and its conduct on the accounting, which matters were not before Your Honor on the main trial, I reach the conclusion, upon consideration of the question, that no basis for an increase is there to be found. With respect to the question of records, defendant has a well organized accounting system, which has been shown to be as elaborate as is customary or necessary in the automotive infringing field. It does not keep costs by operations in producing parts, but such costs would be of little practical use outside of a patent accounting case like this, and the expense of keeping them would not be justified. Because of their physical bulk defendant can retain only a small portion of the records made daily in its plant; and it has developed an elaborate policy, embodied in written instructions, as to the length of time each type of record will be kept. So far as the records pertinent to this case are concerned, defendant's conduct can be summed up by saying that it followed rigidly its routine practice in keeping records, neither making any that it would not ordinarily have made nor destroying any for the express purpose of avoiding liability here. Time studies and overhead breakdown and inventory records have been destroyed, some of the latter since the commencement of this suit; and no separate account was kept of the concurrent production on the Pioch and Walcott machines. While, however, these records would have facilitated to some extent the determination of profits, the cases cited above where damages have been increased on this ground involve more positive action in destroying records. Even if all the records plaintiff claims defendant should have kept after notice in 1929 were available, there would still be wide gaps in the evidence necessary to determine profits with certainty here. There is also some point to defendant's contention that it would have been difficult to tell in advance of the accounting the precise records needed upon it. Finally, as previously in-

dicated, the usual penalty for mere failure to keep records, without more, is to resolve doubts on the questions the records would have cleared up against the defendant, and there is no such aggravated conduct here as to require the application of a more stringent penalty.

Similarly, I do not feel that defendant's conduct on the accounting provides a basis for increasing damages. I do not agree with plaintiff that defendant's whole purpose has been to show a loss irrespective of the facts. Defendant hired reputable independent accountants to prepare its statements of account, and, while I have disagreed with many of their conclusions (as also I have disagreed with some of plaintiff's conclusions), I think they filed honest accounts. There is considerable support for their conclusions on the issues (such as straightening overhead treatment) on which I have sided with plaintiff. Nor did defendant pursue here a policy of obstruction and concealment of facts found in the *Parker Rustproof* and other similar cases. Defendant readily produced records and witnesses requested by the plaintiff, even in instances where the result was adverse to it. It answered the questions propounded in the master's orders of account in considerable detail, with the exception of one to which it made objection. With respect to the various allegedly improper actions of defendant on the accounting pointed to by plaintiff, I cannot see anything going beyond legitimate defense of a lawsuit, except possibly that involving the witness Franklin and the failure of defendant to state in its original accounts that the shaper set forth as a standard of comparison for the Model A shaft was a modification of the original machine. Some of the said actions, such as the use of obsolete shaper drawings, seem clearly to have been pure inadvertence on its part. The situation here seems to me to resemble that in *Wrigley v. Larson, supra* (an unfair competition case), where, although the accounts filed by defendant showed a loss as against substantial profits found by the court, the court refused to assess the fees of plaintiff's accountants against it on the ground that the defendant's accounts had correctly set forth the underlying facts from which an account could be stated, the differences in result being attributable to differences in the application of principles.

With respect to the charges made by defendant as to plaintiff's conduct, the only case cited where such charges were specifically considered as a basis of an increase of damages is that of *Goodyear v. Overman, supra,* in this Circuit, which, however, was reversed on the question of increase upon rehearing. The charges made by defendant are of a serious nature, and I have found them not well founded; however, there have been a great many charges of unfair conduct of the other party in the briefs on both sides in this case. Moreover, while I have not given credit to the charges, if, as must be assumed to be the fact here, defendant did not know of plaintiff's claim of infringement until 1929, its feeling that it has been the aggrieved party is understandable.

In view of these considerations, I do not think that an increase of damages should be awarded, unless the court should be of the opinion that the difference on the record here from the main trial with respect to the defendant's action in continuing infringement after notice in 1929 should justify a different finding from that previously made by the court.

VIII. INTEREST.

Under my recommendations, the plaintiff is entitled to its choice of $206,824.22 as defendant's profits or $120,000 as its damages. It is clear that plaintiff is not entitled to both. *Goodyear v. Overman, supra.* The question of interest on the award has not been discussed in the briefs; but, since *Duplate v. Triplex, supra,* the rule seems to be the same for both profits and reasonable royalty that interest runs from the time the damages are liquidated (generally, the date of the master's report), in the absence of special circumstances, such as deliberate infringement. *General Motors v. Dailey,* 93 F. (2d) 938 (C. C. A. 6, 1937); *Horvath v. McCord, supra*; *Reynolds Spring v. L. A. Young Industries, supra*; *Klooster, Patent Accountings,* 76.

Respectfully submitted,

(Sgd) Donald L. Quaife,
Special Master.

Detroit, Michigan,
March 3, 1941.

SCHEDULE A

PRODUCTION OF CAMSHAFTS ON INFRINGING MACHINES

(For the Period from June 16, 1925 to March 15, 1931)

Month		*Model T T-410*	*Model A A-6250*	*Tractor F-446*
June 16 to 30,	1925	100,575		5,242
July	"	172,650		9,681
August	"	92,700		9,245
September	"	119,500		8,745
October	"	222,950		9,363
November	"	212,950		8,825
December	"	171,880		8,872
Totals, June 16 to Dec. 31, 1925		1,093,205		59,973
January	1926	157,400		11,995
February	"	154,000		12,195
March	"	178,200		15,092
April	"	170,375		10,124
May	"	155,139		8,823
June	"	149,069		9,645
July	"	141,877		6,554
August	"	151,676		6,766
September	"	141,814		6,552
October	"	145,830		4,914
November	"	110,418		4,830
December	"	43,407		1,621
Totals, 1926		1,699,205		99,111
January	1927	83,909		4,636
February	"	68,810		7,032
March	"	93,781		13,510
April	"	80,555		9,704
May	"	83,520		6,944
June	"	13,109		7,398
July	"	12,711		6,531
August	"	14,837		9,977
September	"	18,703		9,737
October	"	16,625		9,606
November	"	12,285	2,553	10,380
December	"	7,241	6,734	5,250
Totals, 1927		506,086	9,287	100,705
January	1928	9,191	13,509	7,795
February	"	7,844	19,512	5,360
March	"	8,041	32,295	2,720
April	"	8,435	44,503	
May	"	12,508	55,306	
June	"	14,878	67,866	
July	"	13,712	69,537	
August	"	13,491	96,098	
September	"	11,760	89,353	
October	"	9,445	117,348	
November	"	5,444	118,145	
December	"	5,699	119,984	
Totals, 1928		120,448	843,456	15,875

Schedule A to Master's Report

Month		*Model T T-410*	*Model A A-6250*	*Tractor F-446*
January	1929	1,222	165,184	
February	"		160,960	
March	"		175,960	
April	"		180,249	
May	"		194,724	
June	"		186,297	
July	"		198,713	
August	"		198,044	
September	"		154,561	
October	"		174,545	
November	"		109,155	
December	"		63,601	
Totals, 1929		1,222	1,961,993	
January	1930		90,529	
February	"		114,714	
March	"		156,386	
April	"		192,275	
May	"		188,833	
June	"		175,441	
July	"		58,814	
August	"		107,808	
September	"		99,128	
October	"		83,699	
November	"		76,478	
December	"		55,160	
Totals, 1930			1,399,265	
January	1931		41,340	
February	"		36,578	
March	"		14,585	
Totals, 1931			92,503	
Grand Totals		3,420,166	4,306,504	275,664

Note: Of the June, 1929, production, 76,032 shafts were produced from June 1 to 12, inclusive, and 110,265 from June 13 to 30, inclusive. The total production subsequent to June 13, 1929 (the date notice of infringement was received by defendant from plaintiff) was 2,500,652 Model A shafts.

SCHEDULE B

PRORATION OF PRODUCTION ON CAMSHAFTS BETWEEN PIOCH AND WALCOTT MACHINES, MAY 14, 1930 TO MARCH 15, 1931, INCLUSIVE

Month	Machines Available		Shifts	Production Per Shift on Piochs	Total Production	Pioch Production	Walcott Production
	Melling	Pioch					
May, 1930 (May 14-30 for Pioch production)	21	1	37 (May 14-30)	240	197,713	8,880	188,833
June	21	1	62	240	190,321	14,880	175,441
July	21	1	22	240	64,094	5,280	58,814
August	21	1	48	240	119,328	11,520	107,808
September	21	1	47	240	110,408	11,280	99,128
October	21	1	39.5	240	93,179	9,480	83,699
November	21	1	36	240	85,118	8,640	76,478
December	21	1	26.5	240	61,520	6,360	55,160
January, 1931 (1st half)	21	2	9	480		4,320	
January (2nd half)	21	4	18	960	62,940 (Full mo.)	17,280	41,340 (Full mo.)
February 2 and 3	21	4	5	960	11,886	4,800	7,086*
February 4-28	13	6	32	1,440	75,572	46,080	29,492*
March 1-15	13	6	17	1,440	39,065	24,480	14,585
					1,111,144	173,280	937,864

*Total for full month, February, 1931—36,578 shafts.

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CLERK'S NOTICE OF THE FILING OF THE MASTER'S REPORT.

(Dated March 3, 1941.)

COPY

Swan, Frye & Hardesty
Attorneys-at-Law
1403 Ford Building
Detroit, Michigan

In re: The Gordon Form Lathe Company

vs.

Ford Motor Company

Equity Docket No. 4564.

Dear Sirs:

Please take notice that on March 3rd, 1941, Donald L. Quaife filed his report as Special Master in the above entitled cause.

Very truly yours,

/s/ GEORGE M. READ,
GEORGE M. READ, *Clerk*,
U. S. District Court.

H.

cc. To BOTTUM, HUDNALL, LECHER, MCNAMARA & MICHAEL, Milwaukee, Wisconsin.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY, 1400 Buhl Bldg., Detroit, Mich.

PLAINTIFF'S OBJECTIONS TO MASTER'S REPORT.

(Filed March 13, 1941.)

Now COMES The Gordon Form Lathe Company, Plaintiff herein, and states and files this its objections to the report of the Honorable Donald L. Quaife, Special Master herein, filed in the office of the Clerk of this Court on the 3rd day of March, 1941, in the following particulars, to-wit:

1. To the Master's finding of the amount of defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of Model A cam shafts over its use of other avail-

able standards of comparison, in so far only as such finding understates the actual amount of such profits, savings, gains and advantages by reason of:

A. The failure to adopt the Landis grinder as the proper standard of comparison.

B. The adoption, as a standard of comparison, of a modification of the Ford cam shaper which the Master assumes would permit of each such shaft being machined in a single operation.

C. In the alternative and without prejudice to the foregoing objections: The failure to find that of all defendant's proposed standards of comparison involving the use of the Ford cam shaper as a standard of comparison, the double shaper method (two Ford cam shapers to machine each shaft) is the only proper standard of comparison, if under applicable law the Ford cam shaper may be regarded at all as a proper standard of comparison.

2. To the statement (Report p. 23 [R. p. 24])* that the "parallel head Walcott" was adopted by defendant after Pioch's inspection thereof in 1929, whereas the fact is, and the Master should have found and ruled, that the same was *not* adopted by defendant.

Respectfully submitted,

THE GORDON FORM LATHE COMPANY,
By: /sgd/ JOHN W. MICHAEL,
/sgd/ GEORGE D. SPOHN,
/sgd/ F. O. RICHEY,
/sgd/ B. D. WATTS,
Attorneys for Plaintiff.

GEORGE R. FRYE,
Solicitor for Plaintiff,
1403 Ford Building,
Detroit, Michigan.

Dated: March 13, 1941.

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* PRINTER'S NOTE: In the Plaintiff's Objections to the Master's Report and in the Exceptions of the Defendant following, the Record pages have been inserted in square brackets after the references to the pages of the original Report, i.e. (Report p. 23 [R. p. 24].)

EXCEPTIONS OF DEFENDANT TO THE REPORT OF THE SPECIAL MASTER.

(Filed March 15, 1941.)

Now comes defendant, Ford Motor Company, by its attorneys, and presents the following exceptions to the report of the Special Master Donald L. Quaife filed in the above entitled action on March 3, 1941.

1. The Master erred in holding that "the testimony of some (though by no means all) of its (defendant's) witnesses was * * * affected by the self interest of their employer" (Report p. 8 [R. p. 10]) and in that he did not name those of defendant's witnesses with proper record references whose testimony he deemed was so affected and those of defendant's witnesses whose testimony was not so affected.

2. The Master erred in that he did not limit the accounting period to the date of actual notice of alleged infringement, viz: June 13, 1929, and in holding that the doctrine of *Wine v. Enterprise*, 297 U. S. 387 and not the doctrine of *Horvath v. McCord*, 100 F. (2d) 326 (C. C. A. 6) applies here to relieve plaintiff, who had licensed others to manufacture the patented machine prior to the issuance of his patent, and who had full and complete knowledge of the use by defendant of the alleged infringing machines, from the clear bounden duty in law and in equity of giving actual, clear and unequivocal, written notice to defendant promptly upon the issuance of plaintiff's patent and its claim of infringement thereof against defendant. (Report pp. 9 to 12 inc. [R. pp. 11 to 14 inc.].)

3. The Master erred in that he did not limit the accounting period for use of the infringing machines from the date of June 13, 1929 and in holding that "no defense of laches as such is made here" (Master's Report p. 12, lines 4 and 3 from bottom of page [R. pp. 14 and 15]) in the face of the proofs and defendant's contentions and arguments (Defendant's Main Brief before Master p. 34 and Conclusion 6, page 140) wherein the defenses of both laches and estoppel were fully and clearly urged against any recovery from defendant prior to June 13, 1929, the date of the only proved actual notice to defendant of plaintiff's patent and plaintiff's claim of infringement thereof.

4. The Master erred as a matter of law and of fact in holding that the non-tilting tool of the modified Walcott machine fully disclosed and published in the Melling patent No. 1,634,550 issued July 5, 1927, four months prior to the commencement of defendant's manufacture of Model A shafts, was not a construction fully available to defendant as a standard of comparison. (Report pp. 22, 23 [R. pp. 23, 24].)

5. The Master erred in that he held the modified Walcott machine with a non-tilting tool to be an infringement of the Gordon patent in suit when no proof was offered by plaintiff to warrant or substantiate any such holding, when such holding is not supported by any record evidence and when such holding and interpretation covers prior art constructions and is made in disregard of file wrapper limitation, estoppels and prior art constructions, none of which limitations, estoppels or prior art constructions were given proper consideration by the Master.

6. The Master erred when, in holding the Westinghouse machine not available to defendant as a standard of comparison, he referred to "experts called by the plaintiff" (Report p. 24 [R. p. 25]) when the sole and singular witness who testified for the plaintiff re this phase of the case was the patentee Gordon, chief owner of the plaintiff's capital stock and whose "testimony was understandingly affected by self-interest" (compare Report p. 8 [R. p. 10] —and Exception 1).

7. The Master erred in view of the concession by plaintiff (Report p. 26 [R. p. 27]) that the Westinghouse machine was available to defendant in that he held the said Westinghouse machine was not a proper standard of comparison on the ground that there is no sufficiently reliable evidence of the speeds obtainable with it in actual production. This holding of the Master is in direct conflict with the uncontradicted testimony of the disinterested witnesses Truxal, Ladley (Westinghouse Company employees not affected with any self interest of the defendant, Ford Motor Company), the testimony of defendant's experienced time study employees, Klopsic and Rauser, and the practical operation and demonstration of the machine for over a full hour's demonstration and time study thereof before the Master, this holding being directly *contra* the law in

this Circuit in *National Tube v. Mark,* 10 F. (2d) 430, the authority of which the Master recognized as binding (Report pp. 30, 31 [R. pp. 30, 31]) upon him for the Ford Shapers as a standard of comparison but which he refused to accept as binding with respect to the Westinghouse machine.

8. The Master erred in that he refused to accept the Ford Shapers as a proper standard of comparison for the Ford Tractor F446 Camshafts in the face of his Finding of Fact that the uncontroverted evidence of Oberhoffken, Brush and Pioch (Report p. 33 [R. p. 33]) compelled a holding that the Ford Shapers constituted a proper standard of comparison for the Model A Ford shafts which differed in no material respect except in dimensions from the Ford Tractor Shafts.

9. The Master erred in that he held *contra* the authority of *Tilghman v. Proctor,* 125 U. S. 136, that because defendant's actual practice was to use grinders for roughing its tractor cam shafts (such use as found by the Master being because tractor production was so small) (Report p. 35 [R. pp. 34, 35]) defendant may not employ as a standard of comparison its old cam shaft shapers which were as clearly available to defendant at any time after 1914 for machining its tractor cam shafts as for either its Model T or Model A shafts.

10. The Master erred in that he did not hold that plaintiff in selecting and insisting upon the use of the Landis grinders, the worst standard of comparison, precluded itself under the Equitable Maxim—"He who seeks Equity must do Equity" from recovering anything but nominal damages.

11. The Master erred in that he refused to allow the cost of direct labor incontrovertibly proved by a host of defendant's witnesses (not all of whom were affected by the "self interest of their employer") and found by the Master as a fact (Report p. 42 [R. p. 41]) to have actually been incurred because of an extra straightening operation found necessary by defendant in its use of the Walcott machines and which operation actually was not used or found necessary by defendant in its use of the Ford Shapers; the Master's ruling in this regard being not only

directly *contra* the rule of law enunciated by the Supreme Court in *Tilghman v. Proctor,* but in effect being a holding that, also *contra* the weight of authority, while a defendant may not have any allowance or deduction for savings resulting from the use of superior facilities (*Duplate* case) it should be penalized for not making a highly problematical better use of the infringing machine.

12. The Master erred in that in spite of the uncontroverted testimony of Oberhoffken, Brush and Pioch and the Master's Finding of Fact (Report p. 47 [R. p. 45]) that the inertia of the parts and not "the cutting speed of the tool is the limiting factor in the speed of the shaper," he made the entirely unwarranted and unsupported inference that machining time of the shaper for the Model A shafts should be reduced 18 percent from defendant's accountant's figures.

13. The Master erred in that when he computed the figure of $206,824.22 as profit to defendant, he tacked on to alleged savings of direct labor costs as a part of defendant's profits, the item of total burden, or overhead, averaging a 150 percent addition.

14. The Master erred in that, although he found plaintiff's claim of the grinder as a standard of comparison unjust, he accepted the testimony of plaintiff's accountant Moise, based solely on the use of such standard, as warranting an addition of 150 percent burden figure to direct labor costs, which addition comprises thirty-one items (Report p. 48 [R. p. 47]) the only two of which, namely, Depreciation and Maintenance, as conceded by counsel for plaintiff and by plaintiff's expert, would be materially affected by the change from defendant's non-infringing prior art shapers to the alleged infringing Walcott machines.

15. The Master erred in that he refused to allow any apportionment of alleged profits in the face of defendant having introduced in evidence the patents to Melling, No. 1,512,995, Ex. 312 and No. 1,655,655, Ex. 209, both relating to patentable features included in the infringing Walcott machine and patentable over the patent in suit and defendant having proved that any profits which could be ascribed to defendant resulted entirely because of the inclusion of these added patentable features.

16. The Master erred in that he did not allow an apportionment of alleged profits based on said added patentable features when after defendant offered evidence to show that any advantages or savings resulted entirely because of the inclusion in the Walcott machines of patented features, additional to and patentable over the invention of the patent in suit, the burden of proof then devolved upon plaintiff to apportion the profits, and plaintiff then failed to offer any evidence bearing either on the patentability of the improvements covered by the Melling patents, Exs. 209 and 312, or bearing on apportionment of profits.

17. The Master erred in that he awarded alleged profits to plaintiff which were in fact not earned but which, even if so earned, could only have resulted from the added patented features of patents, Exs. 209 and 312.

18. The Master erred in that he did not hold that plaintiff failed to carry its burden of proof with respect to apportionment of defendant's alleged profits, and in that he awarded other than nominal damages.

19. The Master erred in that he held that the alleged entire advantages obtained from the use of the Walcott machines accrued to the plaintiff in that said holding constitutes an inference unwarranted by the evidence, the uncontroverted showing by defendant that the tilting tool, the only feature to which the claims of the patent in suit are directed, was not essential in the Walcott machines, but that the machines would operate even more satisfactorily when non-tilting tool heads were substituted for the tilting heads.

20. The Master erred in that he refused to accept as a standard of comparison for defendant's manufacture of Model A shafts (which manufacture did not begin until November 1927) the Walcott machines provided with non-tilting tools and heads of the type shown in the Melling patent No. 1,643,550, granted July 5, 1927, Ex. 313.

21. The Master erred in that he refused to follow the rule of law with respect to apportionment of profits established in *Mason v. Graham*, 90 U. S. 261, the Master recognizing the applicability of such rule of law to the situation in the instant case (Report p. 70 [R. p. 67]) but erroneously holding that such rule of law was modified or overruled by the Supreme Court in its decision in the case

of *Duplate v. Triplex*, 298 U. S. 448 (Report p. 71 [R. p. 68]) the question of apportionment of profits neither having been considered nor ruled upon by the Supreme Court in the latter case.

22. The Master erred in granting to plaintiff all of the alleged profits of defendant and in failing to apportion such profits and by making a proper deduction therefrom for the portion attributable to the added patentable features of the Melling patents Exs. 209 and 312 which rendered the infringing Walcott machines commercially operable and usable by defendant when the record established and the Court of Appeals held by its opinion in this case, that the Gordon machine as covered by the Gordon patent in suit was not usable by defendant.

23. The Master erred in that he did not hold, in view of the admissions against interest of plaintiff's President, Mr. Gordon, that the royalty of 10 percent of the sales price accepted and paid on each and every one of the patented machines that were sold outright by plaintiff, fixed the maximum value recognized by plaintiff of Gordon's patent rights.

24. The Master erred in failing to hold that the plaintiff, having effected a settlement with the Walcott Machine Tool Company, the manufacturer of the Walcott machines used by defendant, and the plaintiff having made such settlement with notice of the Walcott guarantee to the defendant, the plaintiff waived all claim to the recovery of its established royalty and therefore should have had an award of nominal damages only in this accounting.

25. The Master erred in basing his award of reasonable royalty upon contracts entered into between the plaintiff and the Chrysler, Nash, White and Case Companies when such contracts were in the main based upon settlement for past infringement, when such contracts contained express provisions that they should not be used in any future litigation by either of the parties thereto, when such contracts provided they should be null and void in the event of a future settlement made on behalf of any party for the automotive industry, and when the uncontroverted evidence clearly established that such a settlement had been made and that at the time the contracts were offered in evidence they were in fact and in law null and void.

26. The Master erred in that he stated the payments of $2,000 for the use of a four cylinder Walcott camshaft lathe or $3,000 for the use of a six cylinder Walcott lathe paid by the Chrysler, Nash, White and Case Companies have some bearing on the question of reasonable royalty (Report p. 84 [R. p. 79]).

27. The Master erred in that he found "as a conclusion of fact" (Report p. 85 [R. p. 80]) the defendant would have agreed to pay the sum of $5,000 per machine as a reasonable royalty when there is nothing tangible in the record to warrant or support such finding, and moreover, he erred in that he failed to use for a determination of reasonable royalty, the tangible record evidence relative to the 10 percent of the sales price royalty paid by plaintiff.

28. The Master erred in taking the entirely arbitrary amount of $5,000 per machine as representing a reasonable royalty in the absence of any tangible basis to be found in the record to support such amount.

29. The Master erred when in holding the lump sum payments allegedly made by the Chrysler, Nash, White and Case Companies for future use of Walcott machines owned by and in use in the manufacturing establishments of said Companies, the Master failed to take into consideration the fact that such alleged payments, although clearly shown by the record to have been made under duress, as these Companies were bound by the decision in the *Walcott* case, were given for a license to use the said Walcott machines for the remaining unexpired term of the Gordon patent in suit, that the alleged lump sum payments were made in 1930 and the Gordon patent in suit, not expiring until 1942, such payments covered 12 full years of future use of the said Walcott machines.

30. The Master erred in that he used the 1930 lump sum payments per machine made under duress and in that he failed to compute such payment on an annual or yearly basis by taking into account the number of years of future life of the patent in suit, namely 12 years, and in that he failed to find that as six of the twenty-four Walcott machines purchased by defendant were in use in defendant's plant for a period of two years only, and as the remaining sixteen Walcott machines were in use in defendant's plant for a period of six years only such 1930 payments made

for 12 years' future use have no proper application to defendant's use of said Walcott machines.

31. The Master erred in that when he computed the cost to defendant of machining its Model F tractor camshafts, he found that the life of a grinding wheel would be but for the grinding of fifty camshafts, which finding is contrary to the uncontroverted testimony of the defendant's accountant, Woehrle, who testified after an examination of the records of the defendant that grinding wheels as actually used by defendant for the grinding of its Model F tractor camshafts had a life of fifty-five hours, which figure was formally accepted by counsel for the plaintiff, page 37, proceedings of July 18, 1938.

32. The Master erred in not ruling that as no evidence of damage to plaintiff was offered by plaintiff and that as plaintiff's patented machine was not usable by defendant, plaintiff suffered no damage and as defendant could not use plaintiff's machine, defendant could not, and did not, realize any profit from plaintiff's invention and therefore there should be an award of nominal damages only.

33. The Master erred in finding that defendant had realized profits from the use of plaintiff's invention or profits to which the plaintiff is justly entitled.

34. The Master erred in failing to find that on the entire record the plaintiff was entitled only to an award of nominal damages.

Respectfully submitted,

FORD MOTOR COMPANY,
BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
Attorneys.

I. JOSEPH FARLEY,
DRURY W. COOPER,
Of Counsel.

Dated: March 15, 1941.

MOTION FOR ACTION UPON MASTER'S REPORT AND OBJECTIONS THERETO.

(Filed March 22, 1941.)

Now comes Plaintiff, THE GORDON FORM LATHE COMPANY, and upon the pleadings, proceedings, papers and exhibits herein, and upon the annexed Affidavit of Todd L. Moise dated March 19, 1941, moves this Honorable Court for action upon the report of the Honorable Donald L. Quaife, Special Master herein, filed in the office of the Clerk of this Court March 3, 1941, and upon the objections thereto heretofore filed herein.

Respectfully,

THE GORDON FORM LATHE COMPANY,
By: JOHN W. MICHAEL,
GEORGE D. SPOHN,
Attorneys for Plaintiff.

GEORGE R. FRYE,
1403 Ford Building,
Detroit, Michigan,
Solicitor for Plaintiff.

AFFIDAVIT OF TODD L. MOISE.

STATE OF OHIO,
COUNTY OF LORAIN, ss.

TODD L. MOISE, being first duly sworn, states upon his oath:

(1) That he is a certified public accountant, having obtained his certificate to practice as such certified public accountant under the laws of the State of Ohio; that he is a member of the firm of Moise and Burgess, a firm of certified public accountants, having their principal office and place of business in Elyria, Ohio, and a further office in Cleveland, Ohio.

(2) That he was employed by The Gordon Form Lathe Company, plaintiff in an action entitled; The Gordon Form Lathe Company, plaintiff, v. Ford Motor Company, defendant, now pending in the District Court of the United States for the Eastern District of Michigan, Southern Division, In Equity, Docket No. 4564, to consider and advise with

plaintiff on all accounting matters involved in the accounting proceedings recently had in said matter. That he is the same Moise named as a witness and who heretofore testified in said matter on behalf of plaintiff and who is referred to in the report of the Special Master filed in said matter on the 3rd day of March, 1941.

(3) That he has read and analyzed the report of the Special Master herein, so filed, and has prepared two schedules setting forth the actual profits, gains, savings, and advantages of defendant attributable to its use of the infringing Walcott machines on its production of Model A cam shafts over its use of alternative standards of comparison. That said schedules are attached hereto and designated respectively "Schedule I" and "Schedule II."

(4) That in Schedule I affiant has computed and set forth the amount of defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of Model A cam shafts over the use of the Landis Grinder as a standard of comparison; that in Schedule II affiant has computed and set forth defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of Model A cam shafts over the use of two Ford cam shapers to machine each shaft as a standard of comparison.

(5) That the amount of the profits, savings, gains and advantages so set forth in Schedules I and II, attached hereto, are readily computable with reasonable certainty having recourse only to the record on file in this matter, and have been so computed by affiant; that in the computation of defendant's profits, savings, gains and advantages attributable to defendant's use of the infringing machines, as set forth in Schedules I and II, affiant has given effect to and adopted all of the Master's findings with respect to the defendant's production of its Model A cam shafts, excepting only, with respect to each such schedule, the Master's finding on proper standard of comparison.

(6) That Schedules I and II, attached hereto, are alternative schedules. If the Court shall find that the proper standard of comparison on defendant's production of its Model A cam shafts is the Landis Grinder, Schedule I sets forth the amount of defendant's profits, savings,

gains and advantages attributable to defendant's use of the infringing Walcott machines over the use of such Landis Grinder as a standard of comparison; that if the Court shall find that the use of two Ford cam shapers to machine each shaft is a proper standard of comparison, Schedule II sets forth the amount of defendant's profits, savings, gains and advantages attributable to defendant's use of the infringing Walcott machines over the use of such two Ford cam shapers to machine each shaft.

(7) That Schedules III and IV, attached hereto, are alternative recapitulation schedules of costs of cam roughing operations. These schedules are in the form similar to that set forth on the last page of the report of the Master filed herein. There is set forth in Schedule III defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of Model A cam shafts over the use of the Landis Grinder as a standard of comparison. This schedule sets forth such savings, profits, gains and advantages in the sum of $793,773.60, and adopts the Master's finding of such profits, savings, gains and advantages on the defendant's production of its Model T and Model F cam shafts. If the Court shall find that the proper standard of comparison on defendant's production of its Model A cam shafts is the Landis Grinder, then the total of defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of all shafts throughout the accounting period is $901,922.67 as set forth in Schedule III.

There is set forth in Schedule IV defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott machines on its production of Model A cam shafts over the use of two Ford cam shapers to machine each shaft as a standard of comparison. This schedule sets forth such savings, profits, gains and advantages in the sum of $296,025.46, and adopts the Master's finding of such profits, savings, gains and advantages on the defendant's production of its Model T and Model F cam shafts. If the Court shall find that the proper standard of comparison on defendant's production of its Model A cam shafts is two Ford cam shapers to machine each shaft, then the total of defendant's profits, savings, gains and advantages attributable to its use of the infringing Walcott ma-

chines on its production of all shafts throughout the accounting period is $404,174.53 as set forth in Schedule IV.

TODD L. MOISE.

Subscribed and sworn to before me this 19th day of March, 1941.

HILDRETH HECOCK,

(Notarial Seal) *Notary Public, Lorain County, Ohio.*

My Commission Expires May 16, 1942.

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NOTICE OF MOTION FOR ACTION UPON MASTER'S REPORT.

(Filed March 22, 1941.)

To: I. Joseph Farley, Esq.,
c/o Bodman, Longley, Bogle, Middleton & Farley,
1400 Buhl Building,
Detroit, Michigan.

Sir:

The Honorable Arthur J. Tuttle, Judge of the above named Court, having expressed his willingness to hear the parties herein March 31, 1941, on the Master's report and objections thereto heretofore filed herein, and such date being acceptable to Plaintiff, and counsel for Defendant having stated his approval of such date, notice is hereby given that the annexed Motion will be brought on for hearing before the said Honorable Arthur J. Tuttle in his courtroom in the Federal Building, Detroit, Michigan, on said date at 10:00 A. M. or as soon thereafter as counsel may be heard.

GEORGE R. FRYE,
1403 Ford Building,
Detroit, Michigan,
Solicitor for Plaintiff.

JOHN W. MICHAEL,
Of Counsel.

Service of a copy of the foregoing Notice, attached Motion, and accompanying Affidavit, acknowledged this 22nd day of March, 1941.

I. JOSEPH FARLEY,
Attorney for Defendant.

OPINION OF THE HON. ARTHUR J. TUTTLE, DISTRICT JUDGE, ON THE OBJECTIONS TO THE MASTER'S REPORT.

(Rendered April 4, 1941.)

Detroit, Michigan,
Friday, April 4, 1941.
10:30 o'clock A. M.

PRESENT:

Honorable Arthur J. Tuttle,
District Judge.

APPEARANCES:

Messrs. Lecher, Michael, Whyte & Spohn,
(110 East Wisconsin Avenue, Milwaukee, Wisconsin), by

John W. Michael, Esq., and
George D. Spohn, Esq.,

Appearing in behalf of the Plaintiff.

Messrs. Bodman, Longley, Bogle, Middleton & Farley,
(Detroit, Michigan), by

I. J. Farley, Esq., and
Thomas Hughes, Esq.,

Appearing in behalf of the Defendant.

OPINION OF THE COURT.

The Court: Well, I think I have given counsel every opportunity to teach me about this proposition, and if I have not learned a lesson it is the fault of my head, and not counsel.

And right here at the end, in order to declare to you, and not having thought about something that was unnecessary, or to save time and get through, I think I did begin to show you my hand. I had to do that in order to save you time, so from where I have stopped you and told you I didn't want to hear you, you began to get a notion of what I was thinking about, and to go right into the meat of it at the outset now, having the worst of it over, I am going to affirm the Master as to every finding he has made here, except one, and that is as to that overhead.

Now, to go back and drag after that rough job of ploughing.

There were very few of those findings that just satisfied me, and I can just imagine they do not just satisfy him, or anyone else. I don't know about that, but here is a case that just bristles with propositions, that whatever you hold and decide, you are not just satisfied with it, and there is not one of those that I have not felt that, I guess there aren't, anyway, that I felt that way, but anyway many of them I have had that feeling about.

I started out with the idea that I could improve it and I racked my brain as to the proper standard, and every time I worked out some different conclusion than the Master, except as to that overhead, I wound up more dissatisfied than I was with what he did.

Now, that is the truth about it. I have tried to get something better, and I thought I could, but I did not feel just right about it, and I tested it out in every direction, and whatever I selected, and whatever I decided on as different, I wound up more dissatisfied, found it more difficult to square it with my conscience and my head as to what would be right to do, and as to those things I find the report very excellent.

An immense job has been done, an immense task, that this Court has been relieved of by that reference, and by that work.

I can see counsel have been helpful to him and he profited by it, and he produced an excellent report, and as to those things I do not change it. He says it better than I could say it. I not only adopt the conclusion he has reached, but I adopt his approach to it, and his language.

One of the things that I did have great difficulty about, that perhaps I will mention, is whether or not the possibility of computing, not the need for it, not the fact that there had been profit,—I felt there had been profit as a result of the infringement, but the ability either of counsel or parties or witnesses or of the Master or of this Court, the difficulties of doing it, I think we all would agree were great, and the thing I spent much time trying to follow was whether or not the difficulties in the obstacles were not so great that it was impossible to do it, but my final analysis of that is that whenever we are confronted with computing anything in the judicial tribunal, that we have many times

that we have to determine amounts, and we have to do it, with all varieties of cases, and whenever there is necessity of doing that with a certain degree of certainty, we tell ourselves in the law, and we tell the jury and everybody else we cannot guess, but we can draw reasonable conclusions.

That is all right to say, but it is the application of those things that are difficult. We do the best we can to not guess, but to draw reasonable conclusions from proven and established facts, and I am satisfied that there have been profits, substantial profits, and therefore it is the duty of the Court to go as high as we can go fairly from the conclusions, but not so high as to go into the field of guessing, and men with all kinds of judgment find themselves confronted with that.

Somebody is a good judge of horses and of the market. They look at a horse and they can within a few dollars tell you what the horse is worth, if they are a good enough judge. Another man, whose judgment is not so good, will tell you he knows absolutely it is worth $25, and he is just as certain about that as the other man. He would have no hesitancy in making that finding. His doubt is when he tries to go into the higher amounts, and that is when he gets in bad.

The Judge finds his head, and the jury too, in that condition. And not only do we have that situation with reference to all matters, but different kinds of proof. One branch of it may be proved, might be to the complete satisfaction of everybody,—but I doubt if we could say that in this case,—but to that degree of satisfaction that a Judge is willing to rely on it, and then another element of the damages, or the profits, or whatever we are dealing with, may be proved in a much lesser degree, the proof supporting it, and maybe the Court or the tribunal deciding it may find it so uncertain, so lacking in substance and directness and exactness and safeguards that the Court does not feel free to rely on it.

Now, the fact that you find some of that that you can not rely on does not relieve the Court at all, or excuse the Court at all from taking the other thing he can rely on, so I say in this case, for reasons I will discuss more, I felt that the overhead was something I could not rely on, but that does not mean that there was not profit, and that I should

not determine such profits as I think have been properly proven, and so I do go over the Master and get away from that uncertainty of apportionment and all that.

I follow the Master right up to that overhead burden all the way along.

And it is fortunate now that we have this overhead determined, because as it turns out that the Master is right about that, and I am wrong about it, it would be very easy for the Court of Appeals. They have got the figures right there and the amount on there and the reasons, the two lines of reasons to figure it out, and I say, while I change it, right there, I am very frank to say that there are very few things in this case that I approach with that feeling of uncertainty; that I am inclined to judge too much, I think.

There are very few lawsuits that I decide that I do not feel any question about that. I am too much that way.

In all lawsuits that I decide I very seldom am bothered with burden of proof. If there is any proof, either one way or the other, and strong, I am not bothered about that, but I am confessing to you right now that here is a case, with all these controversial questions, that is very debatable and close, but I like the Master's conclusions better than anyone, except now on this question of the overhead.

And I have conjured more with that than anything else here. It is a very interesting thing. I love mathematics. I have liked mathematics all the while I was in college. Anything that partakes of mathematics I just love to conjure on.

It is not that I am good with it, but I like it. It is like music. I cannot take a bit of music, but I love it. The mathematics of the thing appealed to me as a matter of interest, and here it gets to be a very solemn and serious matter.

Now, it seems to me these are the things that prevent me from holding with the Master, and make me upset that overhead.

In the first place, I do not think that a defendant's own books, or anyone else's own books are binding upon them as to results for which they are not kept. And I do not think that is in conflict with Judge Cardozo's decision. Books are kept for the purpose of showing certain things, and they are evidence against me, if they tend that way. It is like an admission, but in taking an admission we inter-

pret a person and what they mean, and not by taking and putting some warped construction on their language. It is what they meant to admit, and the same way when a person keeps their books. What was their object? What was their purpose? You can say if it was good enough for them, when they get into a lawsuit they ought to be bound by it.

But now let us see, what is the purpose of keeping these books in this way. The final purpose was for the Ford Motor Company to know what their automobile had cost them, in the biggest, broadest sense of the word, so that they would know what to charge for an automobile. Now, that is what they were getting at. That is the purpose of it, and there were many departments that contributed pieces to that automobile, and then within that department many operations, and of course this keeping of this record for that final purpose, they just would naturally want to do in a way that what would be practical and economical. Anyone that can keep books themselves can understand that.

When we get to keeping books and are bossed by the Banking Commissioner, or Internal Revenue Department, or somebody else that does not know very much about our business, we find out how troublesome it is, because we were keeping them for our purpose, a certain purpose.

Now, if anyone does come in and take out books that are kept for a certain purpose, and prove a certain thing, and they use those books to prove something else that are not in keeping with it, why of course you would reach the wrong result.

Now, when the Ford Motor Company came to divide up their overhead they put something like 31 different items of expense into what they call their overhead burden.

That in the first place is an arbitrary decision and something that they do to fit their purpose and their needs.

A different kind of a factory, operated in a different kind of a way might put some other items in, and they might not put all of these items in.

Now, in order to tell what the product costs, of course, you have finally have got to get every item of expense of an entire operation. You have got to get it in there somewhere, because if you leave anything out you are just selling on a wrong basis. You are valuing your product on the wrong basis. But if you get it all in, it does not matter on

how arbitrary you are as to the way you do it for this purpose that the Ford has established of finally charging. They can do it as any sort of a method. They would select a method of direct labor, apportioned according to direct labor, in money, as I understand it, on that labor cost, is that right?

Mr. Spohn: The labor cost in money.

The Court: They used the direct labor, the cost of it?

Mr. Spohn: In dollars.

The Court: In dollars, yes. Now, they might have used the hour basis or time basis. I don't know how it would come out. It might not be so satisfactory in some ways, but for their final purpose now it would have been all right, because if you put it all in it would be all right, and there are many, you can conceive of many other different ways of doing it.

Now, we are taking this not for the purpose of finding out how much the car should cost when it was done, but we are now attempting to use what they have used for building up that final figure they wanted to use to apply, and, by the way, this cost that they have built up, and this ratio which they have built up for dividing the overhead burden is applied to this.

Last night's paper said it was the largest factory in the world, probably, and as I understand it it applied to all the property they own, not only in Detroit, but all over the world. That is what somebody said here. They have something like 100,000 employees, millions of dollars worth of property.

Now, for their purpose they have built up this kind of an overhead burden, and this particular method of dividing it.

Now, because it fits them for that purpose does not mean that it works out a correct result at all when you try to fetch it down to one of the many departments, and to the making of one little part that goes into the automobile, and then tracing it down to one of something like fifty operations in making that one little part that goes into the automobile.

I think it is plain to see that as applied to this, that where it is applied absolutely does not fit at all, and does work a very unjust result.

Now, I am not trying to be personal, and I do not talk about my old farm, and that sort of thing, from any egotistical standpoint, but in this world if we just talk about the facts we know about, and we get along better than if we try to talk about things we don't know about.

One of the things I have down in my mind is that I do not think this system, this system as applied now to the great Ford Corporation, and to determining what an automobile is costing the corporation to make, before they begin to sell it, so they can know how much to charge for it, and put in a fair profit, and get ready to figure out how much they can afford to spend for selling it, and will have to spend for selling it, and then know what they will charge the final chap that uses it, fits that fine and works out after that all right, because they have to use up this surplus, or this overhead burden, and this takes care of it, and puts it in where it belongs, and is fine.

Now, as I get down to try to apply this one operation out of many operations in making this one part out of the many parts that go into that automobile, and try to use those figures, used for this other purpose, to determine whether or not the defendant Ford Automobile Company profited, and how much they profited, and apply their system by which I reach out and get part of that overhead, I don't think it fits them any better than it would fit my farm.

Now, in determining out there what my apples cost, and whether or not—I do not have a thing to say about what I will get for them,—I have to take what they give, but that is the difference between making automobiles and being a farmer. That is the reason automobile manufacturers get rich and farmers get poor. That is it right there. I put my finger right there on the difference.

The automobile manufacturer can figure up what his automobile costs, and add his selling expense, and a fair profit, and make that as his selling price, while the fellow that raises apples, he does all that figuring and adds in his overhead, and finds out how much they cost him, and then he does not have a word to say about what he gets. He takes what they give him and carries out the result in red. That is the difference.

But, anyway, I do with that farm just exactly what the Ford Automobile Company does in the way of putting that into the cost of my apples out there. My taxes go in there

and all of it, and I can show you right on my books that I figure it out, how much it cost me that year to produce my apples. All right.

Now, let me assume that I have got two fellows out there doing a job with the horses and I can buy a Ford tractor and one man do the same job. There may be some other elements about these things there, on the cost or something, which you should take into account; feeding the old horse. But I am leaving that out.

Suppose, instead of horses—so as to get rid of the problem of feeding the horses—suppose I had gone from two machines over to one machine, and that is all I have done in that particular direction, I have saved the cost of one man.

And suppose I had that other system—that I really don't have—of apportioning. I just divide the total cost, in which the taxes goes, by the number of bushels, to know what the cost is. But, anyway, I would save the one man out there by putting in a Ford tractor.

Now, suppose it turns out that I have infringed, and they are suing me, and I have got to pay the profit. What was my actual profit, in other words, when I reduced the expense there? Is it possible that I can go back there, because I have divided the number of bushels into finding out what it cost me to produce a bushel of apples—I have to put in the taxes, is it possible that I can now say, when all in the world that happened, and all the honest to goodness saving I have got, I have saved the services of one man.

Now, suppose I had this system of computing overhead, could I, by some method—not by integral or any other kind of calculus, or differential equations or conic sections, can I go into a court of justice and be made to pay when they sue me for infringement? It turns out that the thing I bought was an infringement, and I have got to pay for it. I did save something. I actually saved one hired man. And I won't tell you how cheap the wages are. That is all I saved, as a matter of fact. I can't figure out, on the farm, and as I apply it to my own business, how I saved another cent.

You can say, maybe it cost more for me to supervise—I do it Sundays, anyway—to supervise my men out there. They just do not connect. But I did save the price of one

man. I owe that. It is just as plain to me that I owe it as can be.

But even whether I had the other system—suppose I had that on my books, and when I got sued, they brought in my books, and if I had divided up the apples and put the taxes in—and I do do that. But what has it got to do with the other?

Now, you see, you are using it for a different purpose. And we are reaching, as I see it, a wrong result by it. I just do not think it will work.

Now, here is the only other theory I can get that in on, and that shows that we must think logically and think what we are figuring for.

If I was going to build a plant now, to manufacture, I could build these if I had machinery that would take less men and all that. In other words, I am keeping this in mind in reaching my conclusion, that it can be said in one theory, reasoning for one purpose, like when I am building my plant and getting ready to operate, or if you were getting crowded out of the Ford plant and had to build another; I can say that, that when you shorten the time to do a certain job, in a way you can take credit for your taxes, you can take credit for your depreciation of your building? Why? If I can do something in six months instead of a year, my taxes during six months are only half as much as they are in a year. The depreciation on my building is only half as much. And, so, if I can cut out 30 seconds somewhere when they are figuring, on that theory it is all right.

But that would be on the proposition of building a plant, which you could use as money. But you take the Ford factory out here, as a matter of fact, my illustration of a farm there applies to this one operation. As a matter of fact, it did not eliminate a single official. It did not raise or decrease the salary of a single executive officer. It did not change the size of any building out there.

If I had a farm that was so small, that by putting in something out there you would not have to buy another farm to get into it, that is one situation. But the trouble is we are putting two things together in a way that misleads us, I think.

I do not think that this bookkeeping and this division out at the Ford Company on the basis of manpower, when

we come to apply it down to this, I don't think it will apply.

It is like Kettering's illustration there. It will take one hen three weeks to hatch a set of eggs, then two hens can do it in a week and half. It just doesn't work out; you can't do it.

It didn't happen. It didn't change the Ford taxes. It didn't change. And the theory by which you say it might do it and that you can do it, as I say, would apply if you were building a new outfit and starting in new.

And it might happen in a particular division. There might be a bottle-neck, where the shortening down of a few men or some space, that you could, by means of the infringing article, use less space and save the building of a new building, and all that. Those are things that might happen. But it is something that did not happen in this case; that is the trouble with it.

You might get over to the matter of depreciation as to your particular machine, and then we go over to the other. That is something entirely different. Here you have taken a measuring stick of the direct labor, and based on that you say that because you reduce that one-third, why, therefore, you get rid of one-third of the portion of the overhead tax which otherwise would have been applied to it. But I just think there is a little hitch in there, but which nobody has intended as a trick; I don't mean that. But it is one of those things we run into in life, where we are likely to fall into a false conclusion. And I am fully convinced that this is one of those situations.

I think I have already pointed out instances in which this can be used, and the Ford use of it is one of them.

And then, I say, there might be a bottle-neck where you could apply it.

But, let me show an instance where it would lead to a result which seems to me as unfortunate and as absurd as this one is. I don't think it is any more absurd than the one at the Ford, because, as I look at it, I say it didn't actually affect the taxes at all, it didn't change hardly any of those items.

And here would be one illustration. Going back out to the little village of Leslie, the old telephone company I organized out there more than forty years ago, they are just changing that over and putting in the automatic system,

and there is going to be a little brick building out there with not a soul in it, just these automatic finders going around, I take it, down to the Bell Company here that I have been through. They have an acre of floor space over there with those automatic machines in there. When I was in the telephone business out in Leslie, I think we had 14 employees out there. They are firing them all and putting that little building out there.

Well, they are going to have some taxes to pay. The tax fellow will be around. And they are going to have some overhead. But they just don't bear any relation. Out there, they wouldn't. There is a situation where they wouldn't bear any relation, the labor, I don't think.

I presume the machinery is worth more than those girls sitting there on the chairs they sit in, and the hoods they have on their heads, and the old board they plug into. I dare say that the taxable valuation out there is going to be greatly increased, and yet you wipe out entirely the labor charge.

Now, there is a situation where they would be in an awful hump-up in the benefits that would be charged to them in the way of overhead, for taxes, and everything else that the Bell has. I don't know what the overhead is, but just think of the overhead they would get out there if they were being sued, and this was a benefit, when, as a matter of fact, their taxes would be increased and they should have them credited the other way on that, if it was going to enter into it at all.

I just can't justify the use of that; and, therefore, I wipe that out.

As I see the things in here, you can't be real sure about them. There can be an argument made on the other side of that, but I do feel pretty sure about that item. I just think it is taken from their books and used for an entirely different purpose, for reaching an absolutely wrong result.

And the things said in favor of justifying it, are brought in, not in justification of the system used, but that there are some other things that would counter-balance it.

And when I find a theory of law leading me into something that I can just see and know did not happen, I begin to look for holes in the theory of the law, and the first time I looked at that overhead, I said about it as I would out at the farm; I would say, "I have saved the use of a

man out on the farm; that is what I have saved, and that is all I have saved."

And if they were claiming I had saved part of my taxes, I would say, "Well, where do you get that?" And then they would find that I had been dividing up my taxes to show how much my apples cost a bushel, my head would just begin to whirl then.

Now, I believe I have analyzed that correctly, that we are keeping those books for a different purpose. For that purpose they are right. It is all right to take into account taxes in saying what my apples cost, but when I get to figuring what I have saved by a machine that will save the use of a man, I have got to look and see what I have actually saved, and I have saved the use of a man.

But under ordinary circumstances, you haven't saved anything in taxes. And I think that is what happened out at Ford's. If they had to pay that if they got the other right, then if we made them pay this additional amount, it would just be wrong.

It wouldn't change the taxes. As a matter of fact, it would be more than doubling it because of an item that did not actually exist.

I believe I have already indicated, I had difficulty enough in saying we could compute damages here. Not that there were damages. I think I see that and feel that. But when it comes to the computing of them—and I have gone along with that. I think you are able to do it. But then when you add on to that this other item, I couldn't see that. In the first place, it isn't accurate, but it is just as I see it, it isn't right. It is wrong, I believe.

Now, I don't think there is any necessity of writing any written opinion in this case at all. You have such an excellent report from the Master, and I adopt his results and I adopt his reasons for his results, except on this one thing, and I just disallow that item, and I have stated here as best I could, but very roughly, my line of reasoning as to why I don't allow that item, and why I sustain the exceptions to it.

Now, I do not think it is necessary for me to say if this should be—and for the present I won't, to make my interlocutory decree, so it is complete, and if it stood on my interlocutory decree, the plaintiff still has a right to select the

greater, whether it is profits or damages in the way of reasonable royalty.

And I recognize that this holding changes the high spots for the other way, but they still have the right to select the higher; and, of course, that right will remain after the case is reviewed. So I do not think I need to discuss that, what the decision is. If it stood on my decision and that was finally affirmed, they would elect, and they would have a right to elect the reasonable royalty.

Now, we have all gone without our lunch, and it is late. I could go on talking about reasonable royalty. But I take the Master's finding on that. The same way as those other things here, that I have overruled your objection, for instance, that Mr. Richey and you have so ably discussed to me about the standard. I have got that in mind. I could say a lot about it, but I would keep you until night if I take up each one.

But I like what the Master said so well, that I adopt what he said. And it is only this one that I did not see the same as the Master did, that I have discussed so fully.

Now, you have the benefit of these rough, oral remarks of mine in my decision, which I will sign, if you want, or you can just have them written and put them into the record, and I will appreciate it if you will cut out bad grammar and put good grammar in the place of it.

Mr. Farley: There is just one thing occurs to me. The plaintiffs have made exceptions, but I don't think the matter is of such a nature that they should, but you recall you have affirmed the Master on every point, but the Master did not make a direct holding upon any increase in damages. I believe, however, that is out of the case, but I would prefer to include that.

The Court: I will say I decide there is to be no increase in damages.

Mr. Farley: I would like to have that included.

The Court: I would be glad to include that, and I intended to mention it.

Mr. Spohn: If your Honor please, in the plaintiff's exceptions, the second one, we called the Court's attention to what we believe was a typographical omission in the Master's report. I don't think there is any doubt about that, is there, Mr. Farley?

Mr. Farley: No.

Mr. Spohn: The Master omitted the word "not" at one place in the sentence.

The Court: The Master is here and you are here and I am here, but I always tell them they must not change anything that is in the files, but with all of us here, if you will write that in there, put your initials on and I will put mine, too. Why don't you put it in there?

Mr. Spohn: The Master is here, and he will explain that.

The Master: I haven't spoken on this so far, because I do not think I have any right to do it, but on this particular typographical error, I would like to say something, because I think I can clear it up for both sides.

Mr. Farley: I think I know what the Master has in mind.

The Master: I think my language was a little ambiguous. Mr. Spohn points out on page 23 (Record p. 24) of my report where I say, in finding that the modified Walcott machine was an infringing machine, I add this:

> "My conclusion is reinforced by the fact that the same conclusion was reached by defendant's chief tool designer, Pioch, after inspecting the parallel head Walcott in 1929, as a possible method of avoiding infringement and was thereafter adopted by defendant."

Now, plaintiff filed exceptions on the ground that it was a typographical error, since the machine was not actually adopted by the defendant; that is, this modified machine. What I intended to say—and I realize my language is ambiguous—is that the conclusion that Pioch reached of infringement was thereafter adopted by defendant.

Mr. Spohn: Oh, I see.

The Court: Do you want to change it?

Mr. Spohn: With that understanding in the record, it is all right.

The Court: You have got it right here.

Mr. Spohn: We have got it right here in the record. I mis-read that language.

The Court: All right.

Mr. Farley: I was going to tell you about that, because I read it right, I knew what he was saying.

The Court: Well, I am very much obliged to you gentlemen.

MASTER'S ORDER FOR STATEMENT OF ACCOUNT.

(Dated July 6, 1937.)

Before Donald L. Quaife, Esq., Special Master:

Pursuant to decree on mandate filed and enrolled in the above entitled suit on June 28, 1937, and in furtherance of the reference therein made for the purposes of (1) taking, stating and reporting an account of the profits, gains and advantages which the defendant has derived, received, earned, made or saved since June 16, 1925, by reason of or through its infringement of the Letters Patent of the United States No. 1,542,803 to Gordon and Redlin; (2) assessing the damages which plaintiff has sustained since June 16, 1925, or shall sustain by reason of such infringement by the defendant; (3) taking evidence and reporting on the question of an increase of such damages; and (4) computing a reasonable royalty for the use of the infringing machines by defendant; it is upon plaintiff's motion hereby

ORDERED that the defendant, Ford Motor Company, file with me on or before the 6th day of September, 1937, at my office, Room .... in the Federal Building, Detroit, Michigan, an account or statement in writing, under oath, together with proof of service of two copies thereof on plaintiff's solicitor, which said account or statement shall set forth and include in detail the following items:

1. The total number of infringing machines at any time used by defendant within the period from June 16, 1925, to date.
2. The date of acquisition of each such machine.

* * * * *

15. The cost of repair and maintenance of each such machine, detailed from defendant's monthly, quarterly, annual or other periodic reports compiled with respect to each such machine.
16. The power consumption per work hour of each such machine, detailed from defendant's actual cost records compiled with respect to each such machine.
17. State, per defendant's records, the number, cost (per tool or per unit of tool purchase), type, purpose, and steel test of tools used with respect to each such ma-

chine. If such tools were made by defendant, state cost per defendant's records.

* * * * *

19. State separately the cost of tool maintenance and repair for each such machine, detailed from defendant's actual cost records compiled with respect to each such machine.

20. An itemized statement of defendant's costs per shaft, as detailed from defendant's cost records, of turning the cams thereon by the use of said infringing machines.

* * * * *

25. Point out and describe the method, step by step, and means employed by defendant immediately prior to the adoption and use of said infringing machines for reducing to finished size the rough forged cams of automobile cam shafts.

26. If the method and means referred to in question 25 included a machine other than a grinder for removing the excess metal, describe it, its mode of operation, the particular type or character of shaft or shafts it was used on, and the particular model designation of automobile for which such shafts were designed, and furnish prints or drawings of each such shaft.

27. State the number of machines, if any, described in answer to question 26, at any time used by defendant prior to the adoption and use of said infringing machines; the cost of each such machine (as reflected by defendant's actual cost records if made by defendant or substantiated by manufacturer's invoice if purchased); the date of acquisition of each such machine; the date of first use of each such machine; the date of last use of each such machine; the unit production per hour per machine, while in operation; and the cost per shaft of such operation, such cost to be compiled from defendant's actual cost records.

28. If defendant used a machine other than a grinder as described under question 26, state, per defendant's records, the number, cost (per tool or per unit of tool purchase), and type of cutting tools used in each such

machine. If such tools were made by defendant, state cost per defendant's records.

* * * * *

30. If defendant used a machine other than a grinder, as described under question 26, state cost of repair and maintenance of each such machine, detailed from defendant's monthly, quarterly, annual, or other periodic reports compiled with respect to each such machine.

31. If defendant used a machine other than a grinder under question 26, state separately the cost of cutting tool maintenance and repair for each such machine, detailed from defendant's monthly, quarterly, annual, or other periodic reports compiled with respect to such machine.

32. If defendant used a machine other than a grinder under question 26, state the power consumption per work hour of each such machine, detailed from defendant's actual cost records compiled with respect to such machine.

* * * * *

34. Point out and describe the operations, if any, performed on the cams of automobile cam shafts subsequent to work thereon by the machine referred to in question 26, and furnish a detailed statement of the costs of such operations, such costs to be compiled from defendant's actual cost records.

35. Point out and describe the method, step by step, and means employed by defendant immediately prior to the adoption and use of said infringing machines for reducing to finished size the rough forged cams of tractor cam shafts.

36. If the method and means referred to in question 35 included a machine other than a grinder for removing the excess metal, describe it, its mode of operation, the particular type or character of shaft or shafts it was used on, and the particular model designation of tractor for which such shafts were designed, and furnish prints or drawings of each such shaft.

37. State the number of machines, if any, described in answer to question 36, at any time used by defendant prior to the adoption and use of said infringing ma-

chines; the cost of each such machine (as reflected by defendant's actual cost records if made by defendant or substantiated by manufacturer's invoice if purchased); the date of acquisition of each such machine; the date of first use of each such machine; the date of last use of each such machine; the unit production per hour per machine, while in operation; and the cost per shaft of such operation, such cost to be compiled from defendant's actual cost records.

38. If defendant used a machine other than a grinder, as described under question 36, state, per defendant's records, the number, cost (per tool or per unit of tool purchase), and type of cutting tools used in each such machine. If such tools were made by defendant, state cost per defendant's records.

39. With respect to cutting tools purchased and/or made, as stated under question 38, state which of said tools so purchased and/or made were for purposes of replacement.

40. If defendant used a machine other than a grinder, as described under question 36, state the cost of repairs and maintenance of each such machine, detailed from defendant's monthly, quarterly, annual, or other periodic reports compiled with respect to each such machine.

* * * * *

42. If defendant used a machine other than a grinder under question 36, state the power consumption per work hour of each such machine, detailed from defendant's actual cost records compiled with respect to such machine.

43. Point out and describe the operations, if any, performed on the cams of tractor cam shafts prior to work thereon by the machine referred to in question 36 and subsequent to the forging of such cams, and furnish a detailed statement of the costs of such operations, such costs to be compiled from defendant's actual cost records.

44. Point out and describe the operations, if any, performed on the cams of tractor cam shafts subsequent

to work thereon by the machine referred to in question 36, and furnish a detailed statement of the costs of such operations, such costs to be compiled from defendant's actual cost records.

45. If the method and means employed by defendant immediately prior to the use of said infringing machines for removing the excess metal from the rough forged cams of any cam shafts produced by defendant involved only a grinding or grinding operations, furnish a detailed statement of the actual costs per shaft of such grinding operations, specifying cost of grinding machines and equipment, power consumption, cost of repair and maintenance, cost of grinding wheels, cost of diamonds and other dressing or truing tools, production per hour per grinding machine, while in operation, and all other items entering into the total cost of such operations, on (1) the cams of automobile cam shafts and (2) the cams of tractor cam shafts, such costs to be compiled from defendant's actual cost records.

* * * * *

47. How close to finished size were the cams of (1) automobile cam shafts and (2) tractor cam shafts, reduced on the infringing machines, such data to be compiled from defendant's records.

* * * * *

49. How close to finished size were the cams of tractor cam shafts reduced on the machine, if any, under question 36 above, such data to be compiled from defendant's records.

50. How close to finished size were the cams of (1) automobile cam shafts and (2) tractor cam shafts, reduced by the grinding operation or operations which preceded heat treating or hardening prior to the adoption and use of the infringing machines, such data to be compiled from defendant's record.

* * * * *

53. With respect to cost data compiled from defendant's actual cost records, as stated in answer to any of prior questions, state:

(1) particular basis or method upon which such costs have been computed;

(2) the basic elements of cost, as included in any such costs so computed by defendant;

(3) upon what basis manufacturing burden, if defendant computes burden as an element of cost, is computed;

(4) whether a manufacturing profit is computed by defendant on each manufacturing or processing operation with respect to (a) automobile cam shafts and (b) tractor cam shafts;

(5) the basis upon which depreciation and/or obsolescence is reflected in such costs;

(6) how general manufacturing overhead is allocated to specific operations.

* * * * *

It is Further Ordered that convenient reference shall be made to defendant's books, records or other sources of information upon which the account or statement is based so that plaintiff may readily verify or disprove the account as rendered.

This order is directed to you, your officers, agents, clerks and employees, all in accordance with said amended interlocutory decree and the powers therein and thereby conferred upon me and in accordance with Rules 60, 62, 63 and 64 of the Rules of Practice for the Courts of Equity of the United States and the Statutes of the United States in such case made and provided.

(Sgd) Donald L. Quaife,
Special Master.

Dated:
Detroit, Michigan,
July 6, 1937.

EXHIBIT A—DEFENDANT'S STATEMENT OF ACCOUNT.

(Filed September 27, 1937.)

Responsive to the order of the Special Master entered in the above entitled cause on July 6, 1937, the defendant, Ford Motor Company, herewith submits its Statement of Account concerning the various matters set forth in said order.

Defendant has made careful and thorough search through its old files and records to obtain the fullest possible record evidence for compiling the various statements herein furnished and such search is being continued. If further records are found bearing more directly on the various statements herein set forth, defendant respectfully requests that leave be granted to it to amend or supplement the following statements.

Defendant answers the several paragraphs of said order as follows:

1. A total of twenty-four (24) infringing machines were used by the defendant from June 16, 1925, to date.

2. The date each such machine was acquired, the cost thereof, the manufacturer's serial number and the defendant's identifying number therefor are as follows:

Brass Tag No.	Cost	Serial No.	Date of Acquisition
32067	$4150.00	105	2- 9-24
35472	"	106	2-29-24
36592	4000.00	111	4-19-24
36496	"	109	4-12-24
36552	"	110	4-15-24
36928	"	113	4-29-24
37754	"	116	5-12-24
37844	"	118	5-17-24
38080	"	121	6- 5-24
38005	"	120	5-27-24
36451	"	108	4-11-24
37867	"	119	5-21-24
37732	"	117	5-14-24
36848	"	112	4-24-24
37657	"	115	5- 6-24

Brass Tag No.	Cost	Serial No.	Date of Acquisition
36386	$4000.00	107	4- 4-24
37501	"	114	5- 1-24
37001	"	122	5-29-24
57219	5950.00	214	1- 3-29
57220	"	215	1- 3-29
57578	"	229	4- 9-29
57903	"	226	3-29-29
57945	"	225	3-20-29
57960	"	227	3-29-29

All of the foregoing machines were Melling cam turning lathes and were purchased from Walcott Lathe Company, Jackson, Michigan.

The information above set forth is taken from defendant's permanent inventory of machine tools, the information with respect to each machine being contained on a separate inventory sheet, identified by the corresponding brass tag number.

* * * * *

15. No permanent records were ever made or kept by defendant showing day to day maintenance or repair costs on any machine tools in defendant's plant. During the entire use of the Walcott machines, set forth in paragraph 1 and listed in paragraph 2, four machine tool repairmen devoted practically their entire time on each shift to running maintenance and minor repairs on these machines. Several of the machines were overhauled and the cost of such overhauling is as listed below:

Brass Tag	Order	Date	Cost
32067	B-24802	7-10-24	$ 275.00
35472	R-26501	9- 9-29	1379.55
36592	E-66375	1- 4-29	1728.28
36552	R-34478	10-1929	1517.39
36928	R-26827	9- 9-29	1806.64
37754	R-34994	10-1929	1778.43
38005	R-40938	4-1930	2789.55
36451	E-58333	12- 5-28	1856.75
37867	R-54299	3-1930	1713.64
37732	R-19695	7- 2-29	1310.54

Brass Tag	Order	Date	Cost
36848	E-69225	5- 4-29	$1904.01
37657	E-48294	12- 3-28	1829.19
37501	(R-70888	6-1930	589.62
	(R-7818	4- 2-29	1914.85
36496	E-66495	1- 4-29	1461.02

For further information in respect to defendant's accounting practice, reference is made to paragraph 53 hereof.

16. No record has ever been kept on the power consumption of individual machines or of the machines as a group. It has never been a practice of the defendant to keep records of this character.

17. The cutting tools used in each of the Walcott machines were an ordinary small lathe bit. Records available show that the cost per tool was 25 cents. No records are available which show the number of such tools which were purchased or made by defendant during the period of use of the machines.

* * * * *

19. No records have ever been kept as to cutting tool maintenance cost or cutting tool repair costs for each of the machines or for the machines as a whole.

20. Under defendant's system of accounting a detailed cost of separate operations on all of the parts which enter into the construction of defendant's automobiles are not made a matter of permanent record. The system employed by defendant was to prepare, at convenient intervals, a cost summary of the entire group of operations required to complete any particular part of the car. The group of operations for the manufacture of a camshaft were performed in several different departments of defendant's plant, certain operations, for example, being in the forging department, and other operations in machining departments. Each of the various departments are given, according to defendant's system, a department number and at such intervals when cost summary sheets would be compiled, the entire material, labor and burden costs for any one month would be divided by the number of pieces produced in a particular department and unit costs obtained therefrom. Material

costs involve only the raw stock for fabricating the parts in question. The labor charge in defendant's cost summary includes only what is known as the productive labor, while the burden cost includes non-productive labor, tool replacement, overhead, depreciation and obsolescence of plant and machinery. As these unit costs in defendant's system are charged to an entire department, they do not correctly reflect the actual cost to defendant of any one of the very many operations for completing the finished camshaft. A typical cost summary sheet for the months of May and July 1929, showing the cost of producing the Model A camshaft A-6250, is attached hereto and marked Exhibit 6.

At intervals time studies were made in defendant's plant of the minute labor costs or time consumed in performing the entire sets of operations required for fabricating various parts from raw material to complete the finished product. Photostatic copy of such an operation sheet for fabricating the Model A-6250 camshaft is attached hereto and marked Exhibit 7. This operation sheet shows that 72 separate and distinct operations were performed on the Model A camshaft in the Machining Department No. 410. This sheet also shows the number of minutes for each separate operation, including operation 14, "Rough Turning of all cams," which is the operation performed by the infringing machine. As the cost summary cards charge burden to the entire set of 72 operations, as shown on Exhibit 7, this burden cost does not accurately reflect the actual cost of turning the cams of defendant's camshafts by the use of the infringing machine. Actual costs have been estimated by checking with foremen of the departments and by reference to other available records and such costs for the Model T, Fordson and Model A camshafts are set forth in Exhibit 8 attached hereto.

* * * * *

25. A step by step description of the method and means employed by the defendant, immediately prior to the adoption and use of the infringing machines, for reducing rough forged cams of automobile camshafts to finished size is set forth in the testimony of P. E. Martin and Albert M. Wibel taken in the trial of this cause and reference is made thereto, particularly to that part of such testimony found on pages 204 and 205 and 275 to 277 of the printed

record on appeal of the within cause and Exhibits 53, 53b, 61, 62 and 63 supporting such testimony.

26. The particular machines used for removing excess metal from the camshafts and its mode of operation are all set forth in the testimony and exhibits referred to in paragraph 25 hereof and reference is made thereto. The particular type of camshaft was the shaft T-410 for the Ford Model T automobile (see blueprint, Exhibit 1, referred to in paragraph 6).

27. The following is a list of the machines used by the defendant prior to the adoption of the infringing machines, showing the defendant's identification number for each such machine, the cost thereof, the name of the machine, the date of acquisition thereof and the date of last use thereof.

Brass Tag No.	Cost	Name of Machine	Date of Acquisition	Date of Last Use
7089	$ 4,450.00	18-Z-3 Cam Shaper	10-26-14	4-27-21
8886	3,293.00	"	10-28-15	5- 6-24
10706	4,518.50	"	8- 9-16	12-20-24
11628	4,510.50	"	10-20-16	6- 5-24
12205	4,533.50	"	12- 1-16	12-23-24
15300	4,465.00	"	10-13-17	6- 5-24
15303	4,469.00	"	10-16-17	6-12-24
15353	4,815.00	"	11- 5-17	6- 5-24
15435	4,811.00	"	11-22-17	6-12-24
15436	4,804.00	"	11-22-17	6-12-24
15437	4,854.00	"	11-23-17	4-12-24
19908	10,179.39	"	12- 3-19	4- 9-24
20077	10,179.39	"	12-30-19	4-15-24
28126	5,915.65	"	1- 2-23	6- 5-24
34312	6,178.75	"	1-19-24	12-20-24
34682	5,980.36	"	2- 4-24	4- 8-24
34717	5,956.85	"	2- 4-24	6- 5-24
35289	5,895.69	"	2-25-24	4- 8-24

The information above set forth is taken from the defendant's permanent inventory of machine tools which are permanent records of the defendant and are indexed according to the identifying brass tag number. According to the defendant's practice a permanent inventory card is made out for all machines at the time of acquisition of such machine and the cost as given in the permanent inventory reflects the actual cost of the machine at the time of its acquisition. Manufacturers' invoices relating to these machines have not been preserved. The date on which each machine was first used would be within a few days to a few weeks after the date of acquisition, the latter date only having been made a matter of written record.

An average production of 75 camshafts per operator was obtained on these machines, each operator running two machines. No permanent actual cost records were kept by defendant with respect to the cost of machining the cams of the Model T camshafts on the camshaft shapers, defendant's accounting practice in this respect being fully described in paragraph 20 hereof, to which reference is here made. The cost of machining the Model T camshafts, T-410, has been compiled from such records as are available, and is annexed hereto and marked Exhibit 9.

28. The cutting tools used in the machine described in paragraph 26 were shaper tools identified by the number 9-Z-32, and were designated "blades." Eight of such tools, or blades, were used in each machine. Search through available records resulted in the finding of two material price cards for the period beginning 10/14/21 and terminating 12/15/23, which show that the cost per unit of these tools purchased during such period ranged from $.603 to $1.372. Photostatic copies of these material price cards are attached hereto and marked Exhibit 10.

* * * * *

30. No record exists or was compiled to show the repair and maintenance costs of the machines described in paragraph 26. The permanent inventory of machine tools does not indicate that any of the machines were ever overhauled. Two machine tool repairmen were regularly assigned to the department in which these machines were located to take care of ordinary running repairs and maintenance. For further information as to defendant's accounting practice, reference is made to paragraphs 20 and 53 hereof.

31. No records have ever been kept as to cutting tool maintenance repair costs for each of the machines described in paragraph 26 or for the machines as a whole.

32. No record has ever been kept on the power consumption of the individual machines described in paragraph 26 or of the machines as a whole. It has never been a practice of the defendant to keep records of this character.

* * * * *

34. The sequence of operations on the cams of the Model T camshafts when the shapers as described in paragraph 26 were being used, was the same as the sequence of operations when the infringing machines were being used and comprised the operations as shown on the Operation Sheet, Exhibit 7, operation No. 43 "Semi finish grind all cams," operation 59 "Finish grind all cams to size," operation 61, "Remove burrs from all cams," operation 62, "Polish cams and line bearings," operation 66, "Brush all cams." No actual cost records were kept by defendant in which the cost of these various operations were segregated to each particular operation. The operations above listed, however, were performed by defendant over a long period of years, on all camshafts whether made on the infringing machine or non-infringing machine.

35. The method and means employed by defendant immediately prior to the adoption and use of the infringing machines for reducing to finished size the rough forged cams of tractor camshafts were—

1st. A roughing finish performed by:

(a) A Gordon lathe as disclosed in Plaintiff's Exhibit 2, patent No. 1,542,803, to Charles Gordon and Alfred W. Redlin, and

(b) A rough grinding operation in which the excess material was removed by means of a Landis 10 x 36 grinder.

2nd. Semi finish grinding.

3rd. Finish grinding.

36. The Gordon Lathe is shown and described in said Gordon and Redlin patent. Plaintiff's Exhibit 2, and its intended mode of operation is described therein. The particular type or character of shaft, or shafts, it was used on by defendant, was the shaft of the Fordson tractor, designated as Model F, and the shaft is shown in drawing F-446, blue print of which is furnished herewith in connection with answer No. 7, as Exhibit No. 3. The mode of operation of the Gordon machine in cutting the F-446 camshafts was that of mounting the shaft which had previously been centered between the centers 11 and 20 and clamping the end of the camshaft adjacent to the center 11 in the split collar

16 by means of a clamping bolt 17, as shown in Figs. 9 and 10 of the Gordon patent. The work being rotated in the lathe, the cutting tools 37, one for each of the eight cams to be turned, were oscillated upon an arc having a radius, the center of which coincided with the axis of the shaft 24, as shown in Figs. 6 and 7 of the Gordon patent, this movement of the tool serving to move the point of the tool to and from the axis of rotation of the camshaft being turned. As the camshafts were rotated the tools 37 were given a further oscillation about their cutting points as a center by the action of a cam 44 transmitted through a bell crank lever 52 through gear sector 54 to the gear tooth portion of a tool holder 34 in which the tool 37 was secured. The swinging of the point of the tool 37 through the arc above described was effected by the action of cam 43, all as shown in Figs. 6 and 7 of the Gordon patent.

The mode of operation of the Gordon machine was to oscillate the tool about its cutting point as a center for the purpose of maintaining the side cutting edge of the tool substantially normal to that portion of the work with which the point of the tool at any instant was in contact. Due to the swinging of the tool upon its point, it was necessary that the cam 44 be designed to swing the tool holder 34 through an angle of approximately 80° while the work was turning through an angular rotation of 6°. Because of the impossibility of effecting a movement of approximately 80° of the work holder 34 during but 6° of movement of the work shaft, it was impossible to control the movement of the cutting tool and to keep the roller 53 in contact with the cam 44 as the tool was passing around the nose of the camshaft, the roller dropping through space without touching the master cams while the tool was going around the high point or nose of the cam. Due to the principle of operation of the Gordon machine and the impossibility of controlling the tool movement, the tools undercut the side of the cam on the near side of the nose as the camshaft was rotated towards the tools and left a hump upon the far side of the nose of the cam. The rocking motion of the tool holder 34 was retarded by chips that got in between the rotating surface of the tool holder and tool holder base, which tended to in-

crease the difficulty in keeping the tools at the proper cutting angle. The springs 59 which governed the action of the levers 52 for rotating the tool holders 34 became weak and broke frequently and undue wear on the keys and keyways of the shafts that held the developed master cams 43 and 44 increased the difficulty of maintaining the tools at the proper cutting angles.

37. One Gordon camshaft turning lathe, cost $4,355.00. (See Defendant's Exhibit 54, Machinery Requisition No. 11569, Defendant's Exhibit 55, Permanent Inventory of Machine Tools, and Defendant's Exhibit 56, Ford Motor Company's Purchase Order No. 12620.) Date of acquisition of machine 5/16/23. Date of first use immediately after date of acquisition. The machine was sent to the Willard Machine Tool Company for repair and rebuilding 8/24/23 and was returned to the Ford Motor Company 12/23/23. It was then finally returned to the manufacturer permanently 7/30/24. (Defendant's Exhibit 55 and R. pp. 209 and 210.) Unit Production per hour while in operation approximately five. (R. p. 264.) No permanent cost records were kept by defendant with respect to the cost of producing camshafts on this machine. An estimated cost has been compiled and is attached hereto and marked Exhibit 11.

38. The number of tools employed in the Gordon lathe were eight for the F-446 model shaft. The type of tools are as shown in Figs. 6 and 7 of the Gordon patent (see part 37, see also Defendant's Physical Exhibit 58A. R. pp. 251 and 252). Two sets of eight additional cutters were made by defendant Ford Motor Company at an estimated cost of $3.25 or a total cost of $42.00. After further operation the tool holders were changed to a square tool bit by fastening a plate on the side of the slide at an estimated cost of $6.50 a piece or a total cost of $52.00. Cost of additional tool bits ¼ x ¼ x 1½ inches long 25 cents per tool or $2.00 per set. No written records of these costs were kept and the above costs are estimated.

39. The tools made, as stated in answer 38, were all for purpose of replacement.

40. The repairs and maintenance of the Gordon machine, as described in Question 36, involved the time of two

men sixteen hours a day, not including production and tool room foreman's supervision during the entire tryout period of approximately two hundred hours actual running. No detailed written records were kept in connection with this machine.

* * * * *

42. No record is kept under the Ford Motor Company system of power consumption of individual machines or machines as a group.

43. There was no operation prior to roughing the cams except that defendant rough ground the contour of approximately 120 camshafts to present an even amount of stock for Gordon lathe to help and improve its operation. Cost of such rough grinding (no records). Estimated by recollection, twelve per hour at $1.80 per hour or $.15 each. The amount of shafts scrapped due to poor machining on lathe, approximately 60 percent. (See R. pp. 264, 265.)

44. The operations performed on the cams of tractor camshafts subsequent to work thereon by the Gordon machine, were the same operations as detailed in the answers to Questions 24 and 34 hereof and as shown in Exhibit 7, except that due to the necessity to leave a greater amount of material on the cams for the semi-finish and finish grinding operations, the time required for the case hardening operation, No. 28, Operation Sheet, Exhibit 7, had to be increased to insure a deeper penetration of the case hardening and as more material had to be removed the time of the finish grinding operation was necessarily increased.

45. No written detailed cost records were kept by defendant as to the cost of rough grinding the F-446 Fordson tractor camshafts. The three Landis 10 x 36 grinders with Ford design cam grinding attachment were employed. Brass tag numbers—

40088.....	$2454.00
40093.....	2260.00
40094.....	1595.00

Cost of power consumption. No record kept. Cost of repair and maintenance. No record kept. Repair and

maintenance cost on these grinding wheels would be inconsequential. Cost of grinding wheels averaged $7.50 per wheel with an average life of 90 hours actual operation. No cost records per individual machine or departments for diamonds and other tracing and truing tools were kept or are available. Production per hour, per grinding machine while in operation. Estimated average production twelve shafts per hour. No other items would enter into total cost of operation except overhead as explained in answers to Questions 20 and 53. Rough grinding was used only on tractor camshafts and was never used by the defendant for finishing cams of automobile camshafts. Estimated cost of the grinding operation per shaft is attached hereto and marked Exhibit 12.

* * * * *

47. As shown by drawing T-410, Exhibit 1, the cams were reduced to within 50/1000 of finished size on the infringing machines for the Model T camshafts. Drawing A-6250, Exhibit 2, does not give the rough finished size of the cams, but merely the final finished dimensions. The same is true with respect to drawing F-446 for the tractor camshafts. No records other than the drawings are available. Defendant's practice, extending over the entire period of infringing and non-infringing manufacture of camshafts was to leave 50/1000 stock on all of its camshafts including the tractor and Model A shaft except during the period of use of the Gordon machines it was found necessary to leave 90/1000 stock on the shafts in order to produce a usable article.

* * * * *

49. No written records are available for amount of stock left on camshafts for the F-446 tractor camshaft machined on the Gordon lathe, but the amount of stock left on the shafts was .090 inches (R. p. 267.)

50. (1) No rough grinding operation was performed on the cams of automobile camshafts prior to the adoption and use of the infringing machines, and

(2) Tractor camshafts were reduced to within 50/1000 of finished size by the rough grinding.

* * * * *

53. (1 & 2) The particular basis or method upon which costs have been computed in answer to Questions 20,

27 and 37, and the basic elements of costs included, are explained in the tables, Exhibits 8, 9, 11 and 12.

(3) In accordance with defendant's usual accounting practice, as explained in answer to Question 20 hereof, defendant computes its manufacturing labor cost on the basis of the actual productive minutes or payroll minutes necessary to produce each particular part from rough material to finished product by taking the number of units produced in any one month in any particular department devoted to the manufacture of such part, taking the total amount of productive payroll labor. The total number of parts is divided into the actual productive minutes or payroll minutes devoted by the men on productive labor work in the particular department for the month in question. The actual minute cost is multiplied by the average departmental wage rate per hour during the period for which the record is kept, and this when reduced to a rate per minute, gives the productive labor cost per unit.

The unit material cost represents the purchase price of the rough part, plus a percentage which represents the cost of purchasing, receiving and handling up until the performing of the first operation, also the actual cost of ingredients (not including labor) when the part is produced entirely from raw materials in the plant.

Under defendant's accounting practice burden includes all manufacturing expenses other than productive labor, material, and purchase material handling expenses. Burden is charged to group numbers or departments as shown in the cost summary sheet, Exhibit 6. A group number may cover one or more departments and the burden is pro-rated over the productive parts manufactured in such department or departments, included in each particular group number and includes machine repair, maintenance, tool expense, depreciation, building repairs, building depreciation, sweeping and cleaning, supervision, etc.

(4) A manufacturing profit has never been computed by defendant on each manufacturing or processing operation with respect to either (a) automobile camshafts, or (b) tractor camshafts.

(5) The basis upon which defendant regularly reflects depreciation or obsolescence in computing its manu-

facturing costs is to charge off machinery equipment and durable tools on the basis of an assumed life of eight years thereto, depreciation therefore being charged at the rate of 12½ percent per year on the actual cost of such machinery, and a rate of 3⅓ percent is used by defendant to charge off depreciation and obsolescence on buildings on an assumed life of thirty years. The rate of 12½ percent per year for depreciation was, therefore, employed in the tables above referred to.

(6) General manufacturing overhead, including building repairs, building depreciation, sweeping and cleaning, is charged to the various departments on the basis of square footage. A general overhead for executive and administration expenses is charged to the various departments and non-productive labor of each particular department is charged directly to such department. The burden charged to each department is shown in the cost summary sheet, Exhibit 6, and is charged as a unit cost by dividing the number of units produced in each particular department into the lump sum figure properly assignable to such department for the month the costs are being computed. There is no allocation to specific operations, but merely a lump sum charge to each of the respective departments which cover all operations performed in the department.

* * * * *

FORD MOTOR COMPANY,

O.K.

By B. J. CRAIG, (Sgd.) I. J. F.
Secretary.

BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY, (Sgd.)
Bodman, Longley, Bogle, Middleton & Farley,
1400 Buhl Building
Detroit, Michigan.

(Duly Verified by B. J. Craig.)

EXHIBIT 7 TO DEFENDANT'S STATEMENT OF ACCOUNT

FORD MOTOR COMPANY

OPERATION SHEET

Sheet No. 1

Part Name Camshaft Symbol No. A-6250-A1

Dept. No.	Oper. No.	Name of Operation	Minutes
153-154	A	Shear to 22" length	.2666
1514	B	Cold upset one end	.3311
	C	Heat and forge and hang on conveyor	1.4770
	D	Trim flash	.5143
	E	Normalize at 1500° F, cool slowly	.3429
	F	Tumble to remove scale	.3429
	G	Restrike	.1920
		Die Setter in Dept. 1514 & Stock Men	.8032
410	1	Remove from rough stock conveyor	.1777
	2	Mill both ends to rough length	.2182
	3	Center both ends	.2777
	4	Straighten	.1845
	5	Rough turn center bearing	.6154
	6	Cut recess at each bearing and face inside of flange	1.1429
	7	Turn O.D. of shaft between cams .875"	.8571
	8	Rough turn O.D. of flange and dia. for thread	.1882
	9	Drill one hole 3/16" deep in flange (Use "L" Drill)	.4070
	10	Rough turn front and rear bearing	.4733
	11	Undercut flange	.1920
	12	Indicate and straighten	.2857
	13	Gauge for length and spacing	.1777
	14	Rough turn all Cams	.7143

NOTE: Notify the Accounting Dept. Phone No. 4371 of any Change in Operations.

Revised 7/1/31
By MK:gz
Symbol No. A-6250-A1

FORD MOTOR COMPANY

OPERATION SHEET

Sheet No. 2

Part Name Camshaft Symbol No. A-6250-A1

Dept. No.	Oper. No.	Name of Operation	Minutes
410	15	Cut oil groove in front and rear bearing	.2043
	16	Spot face post with flange	.1781
	17	Re-center both ends	.1781
	18	Rough grind center bearing	.5393
	19	Rough grind front bearing	.3000
	20	Rough grind rear bearing	.3000
	21	Rough grind space for gear in center bearing	.2824
	22	Take off conveyor and gauge	.1777
	23	Indicate and straighten and hang on conveyor	.2526
	24	Cut eleven teeth	2.0869
	25	Burnish gear	.4800
	26	Check for quantity and remove burrs from oil grooves	.1777
	27	Roll gear for size by Dept. 410 (Green)	.1920
	28	Heat to 1470° and quench in caustic solution	.9600
	29	Polish for Rockwell Test	.1777
	30	Indicate from F.D. of gear and straighten	.3491
	31	Roll gear for size by Dept. 410 (Hard)	.1920
	32	Finish grind O D of gear	.3692
	33	Indicate O D of gear for size	.1777
	34	Semi-finish grind center bearing	.3795
	35	Semi-finish grind front bearing	.6159
	36	Semi-finish grind rear bearing	.3765

NOTE: Notify the Accounting Dept. Phone No. 4371 of any Change in Operations.

Revised 7/1/31
By MK :gz
Symbol No. A-6250-A1

FORD MOTOR COMPANY

OPERATION SHEET

Sheet No. 3

Part Name Camshaft Symbol No. A-6250-A1

Dept. No.	Oper. No.	Name of Operation	Minutes
410	37	Face front of flange and chamfer 48° angle	.5189
	38	Gauge bearings and flange for size (by Dept. 410)	.1777
	39	Drill two dowel pin holes through flange	.3095
	40	Indicate for trueness of dowel pin holes	.1777
	41	Undercut burr from dowel pin holes	.1777
	42	Chamfer dowel pin holes one side	.1777
	43	Semi-finish grind all cams	2.2857
	44	Brush teeth and count	.1777
	45	Indicate and straighten	.4800
	46	Indicate front and center bearing	.1777
	47	Re-center front end of shaft	.1777
	48	Re-indicate and straighten (Partial 10%)	.1920
	49	Finish grind center bearing 1.559/1.56" dia.	.4000
	50	Roll gear after grinding center bearing	.1920
	51	Finish grind front bearing 1.559/1.560" dia.	.4800
	52	Finish turn dia. for threads	.5714
	53	Re-indicate for trueness of dowel pin holes	.1777
2455	54	Copper plate spline end (on undersize only) Partial %	.0972
410	55	Finish grind rear bearing 1.559/1.560 dia.	.5714
	56	Gauge dia. for thread and indicate center bearings	.1777
	57	Gauge bearings for size and finish gauge front and rear bearings	.1777

NOTE: Notify the Accounting Dept. Phone No. 4371 of any Change in Operations.

Revised 7/1/31
By MK:gz
Symbol No. A-6250-A1

FORD MOTOR COMPANY

OPERATION SHEET

Sheet No. 4

Part Name Camshaft Symbol No. A-6250-A1

Dept. No.	Oper. No.	Name of Operation	Minutes
410	58	Ream dowel pin hole to .309/.3095	.1777
	59	Finish grind all cams to size	3.1579
	60	Indicate and straighten center bearing	.1777
	61	Remove burr from all cams	.3554
	62	Polish cams and line bearings	.6000
	63	Polish inside of flange	.2666
	64	Grind front of flange	.4800
	65	Cut 1"—16 U S F Threads	.3200
	66	Brush all cams	.1777
	67	Grind flange end of shaft to length and hang on conveyor	.3200
	68	Run through washer	.0000
	69	Repair (Partial)	.1777
	70	Lap gear to size on P D when necessary	.3554
	71	Plug gauge and ream dowel pin holes	.1920
	72	Hang on conveyor for Motor Line	.1777
		Machine Setters, Checkers and Supervision	2.0000
		Repairs on Oper. 33-40-53 (Partial)	.8200
			36.7593

(Continued)

NOTE: Notify the Accounting Dept. Phone No. 4371 of any Change in Operations.

Revised 7/1/31
By MK:gz
Symbol No. A-6250-A1

FORD MOTOR COMPANY

OPERATION SHEET

Sheet No. 5

Part Name Camshaft Symbol No. A-6250-A1

Dept. No.	Oper. No.	Name of Operation	Minutes
		TOTAL MINUTES BY DEPARTMENTS	
Department		153-154	.2666
"		1514	4.0034
"		410	32.3921
"		2455	.0972
		TOTAL MINUTES	36.7593

NOTE: Job retimed in Dept. 1514 from sheet dated 2/20/31

HR Steel Type "EEE" Select Forging Stock 1½" dia. x 242½ long = eleven forgings or 11.0609# required each 8.0313# each rough—5.5166# each finished.

NOTE: Notify the Accounting Dept. Phone No. 4371 of any Change in Operations.

Revised 7/1/31
By MK:gz
Symbol No. A-6250-A1

EXHIBIT 10 TO DEFENDANT'S STATEMENT OF ACCOUNT.

Z No. 9Z-32
Det. 1 #1.

FORD MOTOR COMPANY

MATERIAL PRICE CARD

Description Cutting Tools. Supersedes 28Z-98.

FACTORY AND PURCHASE ORDER COSTS

Date Entered	Order No.	Quan.	Dept.	Total Cost	Unit Cost
	H-40296	480	N-162	539.36	1.1237
10-14-21	H-53602	501	N-162	469.54	.9372
11-17-21	H-57955	335	N-162	362.73	1.083
2- 4-22	A-2441	561	N-162	469.41	.837
4-26-22	A-10779	286	N-162	192.12	.67
5-23-22	A-15006	518	N-162	356.21	.6877
8- 8-22	D-793	700			1.372
7- 1-22	D-73322	600			1.225
6-22-22	A-19282	461	N-162	417.53	.906
7-28-22	A-24320	326	N-162	317.46	.974
1053	Inventory Dec. 31, 1922	381			.974 ea

Z No. 9Z-32

Det. 1 #2

FORD MOTOR COMPANY

MATERIAL PRICE CARD

Description Blades.

FACTORY AND PURCHASE ORDER COSTS

Date Entered	Order No.	Quan.	Dept.	Total Cost	Unit Cost
3-26-23	D-20855	800			1.225
1-10-23	X-1729	545	N-162	328.65	.603
4- 4-23	D-21951	1000			1.225
6- 1-23	D-28069	550			1.18
7-19-23	D-34958	700			1.228
10-15-23	D-45325	1000			.78
12-15-20	D-53675	1200			.98
					.98
			1109		
Inventory Dec. 31, 1923			~~1100~~		.98
Inventory Dec. 31, 1924					.98 ea
Inventory Dec. 31, 1925					.98
Inventory Dec. 31, 1926					.98
Inventory Dec. 31, 1927					.98
Inventory Dec. 31, 1928					

EXHIBIT 11 TO DEFENDANT'S STATEMENT OF ACCOUNT.

COMPUTATION OF CERTAIN ITEMS OF COST OF GORDON LATHE OPERATION ON TRACTOR CAMSHAFTS.

(a) *Cost of material* ..... $.8734 per camshaft.

(b) *Cost of first twelve machining operations.*

The first twelve machine operations are estimated to have the following respective costs:

Oper.	Minutes per shaft	B. O. Material cost ea.	.80 per hr. .01333 per min. Labor Cost Ea.	June '25 157% Burden Cost Each	Total Cost Per Operation	Accu late Cos
1. Mill ends to rough length	.2182	.8734	.0029	.0046	.8809	.88
2. Center both ends	.2777		.0037	.0058	.0095	.89
3. Straighten	.1845		.0025	.0039	.0064	.89
4. Rough-turn center bearing	.6154		.0082	.0129	.0211	.91
5. Cut recess at each bearing and face inside of flange	1.1429		.0152	.0239	.0391	.95
6. Turn O. D. of shaft between cams	.8571		.0114	.0179	.0293	.98
7. Rough-turn O. D. of flange and dia. for thread	.1882		.0025	.0039	.0064	.99
8. Drill one hole 3/16" deep in flange	.4070		.0054	.0085	.0139	1.00
9. Rough-turn front & rear bearing	.4733		.0063	.0099	.0162	1.02
10. Undercut flange	.1920		.0026	.0041	.0067	1.02
11. Indicate and straighten	.2857		.0038	.0060	.0098	1.03
12. Gauge for length and spacing	.1777		.0024	.0038	.0062	1.04

Total estimated cost of first twelve operations including materials..$1.0455 per camshaft.

The foregoing estimate is arrived at by taking the minute cost of the same operations on Model A camshafts (see Exhibit 7) and by applying to such minute cost the average labor rate of $.80 per hour and a burden rate of 157%, such burden rate being the burden applicable to the entire department in 1925. No records exist or were made to show actual costs of specific operations.

(c) *Cost of turning cams on Gordon machine.*

1. Labor.

Rate of production ..... 5 shafts per hour.
Productive labor rate ..... $.80 per hour.
Labor cost per shaft:
$.80 ÷ 5 = $.16 per shaft.

2. Burden.
Standard burden:
$.16 x 157% = .2512.

Special tool repair cost:
Two tool repair men at $.90 per hour = $1.80.
Production ..... 5 pieces per hour.

Tool repair cost per shaft:
$1.80 ÷ 5 = $.36 per camshaft.

Total burden	.2512
	.3600
	$.6112

(d) *Cost of scrapping due to defective work on Gordon Machine operation.*

It appears that in using the Gordon machine 60% of all shafts placed in the machine were defectively machined and had to be scrapped. In other words, the usable output was only 40%. The increased cost due to this fact is arrived at as follows:

Cost of first twelve operations, including material	$1.0455
Cost of scrapping ..... $\frac{1.0455}{40\%}$ — 1.0455 =	$1.5683

(e) *Recapitulation of cost of turning cams.*

Direct labor	$ .1600
Burden	.6112
Losses due to scrapping....	1.5683
	$2.3395 per camshaft.

In the foregoing no provision has been made for machine depreciation except insofar as the same may be adequately represented by the standard burden rate. This burden rate (157%) was for the department as a whole. It is probably too low for this particular operation as expensive machinery was used.

EXHIBIT 12 TO DEFENDANT'S STATEMENT OF ACCOUNT.

COMPUTATION OF CERTAIN COSTS INVOLVED IN ROUGH GRINDING OPERATION ON TRACTOR CAMSHAFTS BY LANDIS 10x36 GRINDERS DURING PERIOD JULY 1, 1925 TO JANUARY 1, 1928.

In the following no provision has been made for any items other than those expressly described. In particular no provision has been made for any of the following: materials, scrap losses, transportation, and general overhead including buildings, heating, production supervision, power, administration, taxes and general expenses.

(a) Average yearly production during period 90,263 cams.
This figure is taken from paragraph 3 (a) of Exhibit 8.

(b) *Depreciation cost of grinding machines.*
Original cost of machines:

No. 40088	$2454.00
" 40093	2260.00
" 40094	1595.00
	$6309.00

Depreciation cost*
$6309.00 x 12½% = $788.63.

* See paragraph 53 and paragraph 1(b) of Exhibit 8.

(c) *Machine depreciation cost per camshaft.*
Machine depreciation per year (see (b) above) $788.63
Average yearly camshaft output ..... 90,263.
Machine depreciation cost per camshaft:
$788.63 ÷ 90,263 = .0087.

(d) *Direct labor cost per camshaft.*
Production per man ..... 8 shafts per hour
Productive labor rate ..... $.80 per hour.
Direct labor cost per camshaft:
$.80 ÷ 8 = $.10 per camshaft.

(e) *Grinding wheel cost per camshaft.*
Cost of grinding wheel .....$7.50 each.
Life of grinding wheel (estimate) .....65 hours.

(f) Camshaft output in 65 hours:

65 x 8 = 520.

Grinding wheel cost per camshaft:

$7.50 ÷ 520 = .0144

(g) *Recapitulation of costs per camshaft.*

Machine depreciation	.0087
Direct labor	.10
Grinding wheels	.0144
	$.1231

EXHIBIT B—AMENDMENT TO DEFENDANT'S STATEMENT OF ACCOUNT.

(Verified December 31, 1937)

As was stated in the original Statement of Account filed herein on September 27, 1937, search was at that time being continued through the old files and records of the defendant Ford Motor Company to obtain the fullest possible record evidence for compiling the various statements of account at that time furnished, and leave was asked to amend or supplement the statement of account if further records were found bearing more directly upon the various statements. Defendant has, since the filing of the first Statement of Account herein, employed the services of a competent firm of certified public accountants, and as a result, further records have been discovered and it is now desired to amend the original Statement of Account above referred to in the following respects:

Substitute for paragraph *2* the following:

2. The date each such machine was acquired, the cost thereof, the manufacturer's serial number and the defendant's identifying number therefor are as follows:

Brass Tag No.	Cost	Serial No.	Date of Acquisition
32067	$4121.57	105	2- 9-24
35472	4347.71	106	2-29-24
36592	4081.65	111	4-19-24
36496	4106.42	109	4-12-24
36552	4093.83	110	4-15-24
36928	4010.40	113	4-29-24
37754	4109.98	116	5-12-24
37844	4014.03	118	5-17-24
38080	4014.03	121	6- 5-24
38005	4014.03	120	5-27-24
36451	4170.38	108	4-11-24
37867	4014.03	119	5-21-24
37732	4184.39	117	5-14-24
36848	3944.18	112	4-24-24
37657	4083.23	115	5- 6-24
36386	4093.49	107	4- 4-24
37501	4069.29	114	5- 1-24
37001	3973.19	122	5-29-24
57219	5892.34	214	1- 3-29
57220	5892.35	215	1- 3-29
57578	5875.52	229	4- 9-29
57903	5883.62	226	3-29-29
57945	5874.48	225	3-20-29
57960	5881.46	227	3-29-29

All of the foregoing machines were Melling cam turning lathes and were purchased from Walcott Lathe Company, Jackson, Michigan.

The information above set forth is taken from defendant's Permanent Record of Machine Tools and Machinery Valuation Record, the information with respect to each machine being contained on a separate record sheet, identified by the corresponding brass tag number.

* * * * *

Substitute for paragraph *27* the following:

27. The following is a list of the machines used by the defendant prior to the adoption of the infringing machines, showing the defendant's identification number for each such machine, the cost thereof, the name of the machine,

the date of acquisition thereof and the date of last use thereof.

Brass Tag No.	Cost	Name of Machine	Date of Acquisition	Date of Last Use
7089	$ 4,450.00	18-Z-3 Cam Shaper	10-26-14	4-27-21
8886	3,246.00	"	10-28-15	5- 6-24
10706	4,503.35	"	8- 9-16	12-20-24
11628	4,463.50	"	10-20-16	6- 5-24
12205	4,473.50	"	12- 1-16	12-23-24
15300	4,424.39	"	10-13-17	6- 5-24
15303	4,413.00	"	10-16-17	6-12-24
15353	4,755.00	"	11- 5-17	6- 5-24
15435	4,766.39	"	11-22-17	6-12-24
15436	4,775.56	"	11-22-17	6-12-24
15437	4,842.99	"	11-23-17	4-12-24
19908	10,179.39	"	12- 3-19	4- 9-24
20077	10,179.39	"	12-30-19	4-15-24
28126	5,915.65	"	1- 2-23	6- 5-24
34312	6,178.75	"	1-19-24	12-20-24
34682	5,980.36	"	2- 4-24	4- 8-24
34717	5,956.85	"	2- 4-24	6- 5-24
35289	5,895.69	"	2-25-24	4- 8-24

The information above set forth is taken from the defendant's Permanent Record of Machine Tools and Machinery Valuation Record, which are permanent records of the defendant and are indexed according to the identifying brass tag number. According to the defendant's practice a permanent record card is made out for all machines at the time of acquisition of such machine and the cost as given in the permanent inventory reflects the actual cost of the machine at the time of its acquisition. Manufacturers' invoices relating to these machines have not been preserved. The date on which each machine was first used would be within a few days to a few weeks after the date of acquisition, the latter date only having been made a matter of written record.

An average production of 50 camshafts per operator was obtained on these machines, each operator running two machines. No permanent actual cost records were kept by defendant with respect to the cost of machining the cams of the Model T camshaft on the camshaft shapers, defendant's accounting practice in this respect being fully described in paragraph 20 hereof, to which reference is here made. The cost of machining the Model T camshafts, T-410, has been compiled from such records as are available and is annexed hereto and marked Exhibit 9.

* * * * *

Substitute for paragraph *30* the following:

30. No record exists or was compiled to show the repair and maintenance costs of the machines described in paragraph 26. The Permanent Record of Machine Tools indicates that only three of the machines were ever overhauled. No costs of these overhauls are available. Two machine tool repairmen were regularly assigned to the department in which these machines were located to take care of ordinary running repairs and maintenance. For further information as to defendant's accounting practice, reference is made to paragraphs 20 and 53 hereof.

* * * * *

Substitute for paragraph *34* the following:

34. The sequence of operations on the cams of the Model T camshafts when the shapers as described in paragraph 26 were being used, was the same as the sequence of operations when the infringing machines were being used except that the straightening operation which was required prior to the turning operation on the infringing machines was not required prior to the shaping operation on the shapers. The operations performed on the cams subsequent to the rough machining operation were as shown on the operation sheet, Exhibit No. 13, attached to Defendant's Further Statement of Account and comprised operation No. 14, "Polish Cam," operation No. 34, "Grind Cams," operation No. 37 "Remove burr from cam," operation No. 43, "Polish minor cams." No actual cost records were kept by defendant in which the cost of these various operations were segregated to each particular operation. The operations above listed, however, were performed by defendant over a long period of years, on all camshafts whether made on the infringing machine or non-infringing machine.

* * * * *

Substitute for paragraphs *44* and *45* the following:

44. The operations performed on the cams of tractor camshafts subsequent to work thereon by the Gordon machine, were substantially the same operations as shown on operation sheet, Exhibit No. 17 except that due to the necessity to leave a greater amount of material on the cams for operation No. 23, "Finish Grind Cams," the time

required for operation No. 15 "Harden," had to be increased to insure a deeper penetration of the case hardening and as more material had to be removed the time of the finish grind cams operation was necessarily increased.

45. No written detailed cost records were kept by defendant as to the cost of rough grinding the F-446 Fordson tractor camshafts. The three Landis 10 x 36 grinders with Ford design cam grinding attachment were employed. Brass tag numbers—

40088	$2593.85
40093	2399.85
40094	1636.20

Cost of power consumption. No record kept. Cost of repair and maintenance. No record kept. Repair and maintenance cost on these grinding wheels would be inconsequential. Cost of grinding wheels averaged $7.50 per wheel with an average life of 55 hours actual operation. No cost records per individual machine or departments for diamonds and other tracing and truing tools were kept or are available. Production per hour, per grinding machine while in operation. Estimated average production eight shafts per hour. No other items would enter into total cost of operation except overhead as explained in answers to Questions 20 and 53. Rough grinding was used only on tractor camshafts and was never used by the defendant for finishing cams of automobile camshafts. Estimated cost of the grinding operation per shaft is attached hereto and marked Exhibit 12.

* * * * *

Substitute for paragraph *53(6)* the following:

53 (6) General manufacturing overhead, including building repairs, building depreciation, sweeping and cleaning, is charged to the various departments on the basis of square footage. A general overhead for executive and administration expenses is charged to the various departments by being prorated on a productive labor basis, and non-productive labor of each particular department is charged directly to such department. The burden charged to each department is shown in the cost summary sheet, Exhibit 6, and is charged as a unit cost by dividing the

total departmental productive labor in each particular department into the lump burden figure properly assignable to such department and applied to the unit labor cost on a percentage basis for the month the costs are being computed. There is no allocation to specific operations, but merely a lump sum charge to each of the respective departments which cover all operations performed in the department.

FORD MOTOR COMPANY,
By B. J. CRAIG (signed)
Secretary.

(Ptf. Rec. Vol. III beginning line 18, page 29 of Typewritten Transcript.)

(29) Mr. Spohn: Now, if your Honor please, as Mr. Watts has pointed out, the statements of account filed by the defendant in this case under the rule are pleadings. There are three statements of account and they have been designated for purposes of identification for cross examination as Exhibits A, B and C: Exhibit A being the first statement of account, and B being an amended statement of account, and Exhibit C being defendant's further statement of account.

These statements of account, as I say, are pleadings. Plaintiff admits some of the facts therein stated and denies others, and of course as to those denied puts defendant to its **(30)** proof, and it is my purpose now to advise the Court and counsel for the defendant what portions of these three accounts are admitted by the plaintiff and what portions of these accounts are denied, and when I say "admitted" may that be understood as accepted by the plaintiff, and when I say "denied" may it be understood as meaning rejected by the plaintiff, and I am going to go through this slowly. There are 53 questions involved in the first account, the answers to which in some instances were amended, in the amended account.

Question No. 1 is admitted. The answer is admitted.

Question No. 2, the answer as amended is admitted.

* * * * *

Question No. 15, plaintiff admits the first sentence of the answer and denies the balance of the answer to that question.

Question No. 16, plaintiff admits the answer.

Question No. 17, plaintiff admits the answer.

* * * * *

Question No. 19, plaintiff admits the answer.

Question No. 20, plaintiff admits the first paragraph of the answer and rejects all the material in the second paragraph of the answer, that material following the words, "is attached hereto and marked Exhibit 6."

* * * * *

Question No. 25, plaintiff admits the answer.

Question No. 26, plaintiff admits the answer.

Question No. 27, plaintiff admits the amended answer, excepting only that portion thereof reading as follows, which portion of the answer plaintiff denies: "No permanent actual cost records were kept by defendant with respect to the cost of machining the cams of the model T cam shaft on the cam shaft shapers, defendant's accounting practice in this respect being fully described in paragraph 20 hereof to which reference is here made. The cost of machining the model T cam shafts, T-410, has been compiled from such records as are available and is annexed hereto and marked Exhibit 9."

Question No. 28, plaintiff admits the answer.

* * * * *

Question No. 30, plaintiff denies both the original answer and the amendment to the answer.

Question No. 31, plaintiff admits the answer.

Question No. 32, plaintiff admits the answer.

* * * * *

Question No. 34, plaintiff admits defendant's original answer to question 34 and denies the amended answer.

Question No. 35, plaintiff admits the answer excepting the following portion of the answer which plaintiff denies: "(a) A Gordon lathe as disclosed in Plaintiff's Exhibit 2, Patent No. 1,542,803 to Charles Gordon and Alfred W. Redlin."

Question No. 36, plaintiff denies the answer.

(33) Questions 37, 38, 39, 40, 42, 43, plaintiff denies defendant's answer.

Question No. 44, plaintiff denies the defendant's answer in its original statement of account and also as amended.

Question No. 45, plaintiff admits defendant's amended answer, excepting only computation of costs and elements of costs as designated by defendant on Exhibit 12 therein referred to.

* * * * *

Question No. 47, plaintiff accepts defendant's answer.

* * * * *

Question No. 49, plaintiff denies the answer.

Question No. 50, plaintiff admits the answer.

* * * * *

Question 53, plaintiff accepts the answer and admits the same, but denies the basis and methods therein set forth.

* * * * *

MASTER'S ORDER FOR STATEMENT OF ACCOUNT.

(Dated October 29, 1937.)

Before Donald L. Quaife, Esq., Special Master:

On motion of plaintiff and it appearing necessary and advisable that defendant's statement of account heretofore filed herein be supplemented in the hereinafter mentioned respects,

IT IS ORDERED that defendant file with me on or before the 1st day of December, 1937, at my office, Room 729 in the Federal Building, Detroit, Michigan, an account and statement in writing, under oath, together with proof of service of two copies thereof on plaintiff's solicitors, which said account and statement shall include and set forth the following:

1. State and report by monthly, quarterly or annual accounting periods in debtor-creditor form, a full and complete account of all profits, gains, savings and advantages which the defendant has derived, received, earned, made or saved, since June 16, 1925, by reason of or through its infringement of the Letters Patent in suit No. 1,542,803.

2. State whether or not defendant relies on any standard of comparison in determining any of its profits, gains, savings and advantages by reason of said infringement in respect to (a) its Model T cam shafts, (b) its Model A cam shafts, or (c) its tractor cam shafts.

3. State whether or not defendant employed any standard or standards of comparison in the account filed in response to Section 1 hereof.

4. If defendant relies on any standard or standards of comparison, or uses any standard or standards of comparison in the account filed in response to Section 1, identify and describe fully each such standard of comparison and the method and/or apparatus on which it is based, and furnish drawings of such apparatus and state where, when, by whom, and for what purpose such method and/or apparatus was used, and state where plaintiff may inspect such method and/or apparatus or any exemplification thereof on which defendant relies.

5. If defendant has used any standard or standards of comparison in its statement of account filed in response to Section 1 hereof, state fully the means and method by

which defendant arrived at all costs set forth with respect thereto and all bases for computing such costs, and if any records of actual costs of actual operation of such standard or standards were used by defendant, furnish summary cost schedules thereof.

* * * * *

8. State what disposition defendant has made of each of its infringing machines. If any of said machines were disposed of by transfer, sale or otherwise, state the date of such disposition and the amount of money or other consideration received therefrom, and identify the person or persons, company or companies who acquired such machines.

9. If defendant has had any infringing machine rebuilt or converted, state as to each such machine how and in what manner such machine was rebuilt or converted, what use has been made of it since it was rebuilt or converted, and what value was assigned thereto on defendant's records upon completion of such rebuilding or conversion.

10. Within the period Jan. 1, 1923, to Jan. 1, 1924, how many tractor cam shafts did defendant rough grind, how many grinding wheels did defendant consume in such grinding and what was the cost of such wheels.

IT IS FURTHER ORDERED that convenient reference shall be made to defendant's books, records or other sources of information upon which the account or statement is based so that plaintiff may readily verify or disprove the account as rendered.

This order is directed to you, your officers, agents, clerks and employees, all in accordance with said amended interlocutory decree and the powers therein and thereby conferred upon me and in accordance with Rules 60, 62, 63 and 64 of the Rules of Practice for the Courts of Equity of the United States and the Statutes of the United States in such case made and provided.

AND IT IS FURTHER ORDERED that plaintiff have leave to reserve its objections and exceptions, if any, to defendant's statement of account heretofore filed.

DONALD L. QUAIFE,
Special Master.

Dated:
Detroit, Michigan,
October 29, 1937.

EXHIBIT C—DEFENDANT'S FURTHER STATEMENT OF ACCOUNT.

(Dated December 31, 1937.)

Before Donald L. Quaife, Esq., Special Master:

Responsive to the order of the Special Master entered in the above entitled cause on October 29, 1937, the defendant, FORD MOTOR COMPANY, herewith submits its further statement of account concerning the various matters set forth in said order.

1. While paragraph 1 of said order orders that an account be stated by monthly, quarterly or annual periods in debtor-creditor form, we have prepared this account to cover the entire period of operation of the infringing machines because we feel that the use of the entire period reflects more accurately the comparative costs of production from which profits, savings and advantages may be computed and is less complicated than if an attempt were made to segregate or separate the entire period of operation by monthly, quarterly or annual periods of time.

(1)*

PRINTER'S NOTE:

In this *Exhibit C—Defendant's Further Statement of Account*, the ENDS of the pages enumerated by the Designation have been indicated by boldface figures in parentheses.

FORD MOTOR COMPANY

COMPARATIVE COSTS OF CERTAIN OPERATIONS IN MACHINING MODEL T-410 CAMSHAFTS

on Ford Cam Shapers and on Melling Cam Lathes
for the period from June 16, 1925 to January 15, 1929

	Debits	Credits
	Costs on Ford Cam Shapers	Costs on Melling Cam Lathes
Costs compared (a):		
Direct labor	$169,117.52	$176,848.62
Depreciation	19,248.69	16,921.58
Maintenance repairs	8,252.10	14,853.80
Extraordinary repairs	— (b)	23,579.66 (c)
	$196,618.31	$232,203.66
*Loss** due to use of Melling cam lathes	—	*35,585.35*
	$196,618.31	$196,618.31
Cost per camshaft	$.0575	$.0679

(a) No cost records are available to show, by separate operations, the comparative power costs, tools costs, scrap losses or other incidental items.

(b) The records for the Ford cam shapers, for the period in which these machines were used, indicate only 3 instances of extraordinary repairs for overhauling; the amounts expended are not available.

(c) Expenditures were made in 1928, 1929 and 1930 on 14 Melling cam lathes; the necessity for overhauling resulted principally from the use of the machines on Model T-410 production.

Schedule I
Sheet 1

* Words and figures in italics were red in the original.

FORD MOTOR COMPANY

COMPARATIVE COSTS OF DIRECT LABOR FOR THREE OPERATIONS ON MODEL T-410 CAMSHAFTS ON FORD CAM SHAPERS AND ON MELLING CAM LATHES

for the period from June 16, 1925 to January 15, 1929

Periods	Production of Model T-410 Camshafts	FORD CAM SHAPERS			MELLING CAM LATHES		
		Hours Required for Three Operations (Production multiplied by 3.50 minutes or by .05833333 hours)	Average Direct Labor Rates	Direct Labor Cost of Three Operations	Hours Required for Three Operations (Production multiplied by 3.66 minutes or by .061 hours)	Average Direct Labor Rates	Direct Labor Cost of Three Operations
June 16-30, 1925	100,575	5,866.87	$.8171	$ 4,793.82	6,135.08	$.8171	$ 5,012.97
July	172,650	10,071.25	.8318	8,377.27	10,531.65	.8318	8,760.23
August	92,700	5,407.50	.8245	4,458.48	5,654.70	.8245	4,662.30
September	119,500	6,970.83	.8143	5,676.35	7,289.50	.8143	5,935.84
October	222,950	13,005.42	.8008	10,414.74	13,599.95	.8008	10,890.84
November	212,950	12,422.08	.8046	9,994.81	12,989.95	.8046	10,451.71
December	171,880	10,026.33	.8191	8,212.57	10,484.68	.8191	8,588.00
January, 1926	157,400	9,181.67	.8204	7,532.64	9,601.40	.8204	7,876.99
February	154,000	8,983.33	.8213	7,378.01	9,394.00	.8213	7,715.29
March	178,200	10,395.00	.8305	8,633.05	10,870.20	.8305	9,027.70
April	170,375	9,938.54	.8358	8,306.63	10,392.88	.8358	8,686.37
May	155,139	9,049.77	.8317	7,526.69	9,463.48	.8317	7,870.78
June	149,069	8,695.69	.8462	7,358.29	9,093.21	.8462	7,694.67
July	141,877	8,276.16	.8498	7,033.08	8,654.50	.8498	7,354.59
August	151,676	8,847.77	.8507	7,526.80	9,252.24	.8507	7,870.88
September	141,814	8,272.48	.8594	7,109.37	8,650.65	.8594	7,434.37
October	145,830	8,506.75	.8724	7,421.29	8,895.63	.8724	7,760.55
November	110,418	6,441.05	.8924	5,747.99	6,735.50	.8924	6,010.76
December	43,407	2,532.07	.9038	2,288.48	2,647.83	.9038	2,393.11
January, 1927	83,909	4,894.69	.9178	4,492.35	5,118.45	.9178	4,697.71
February	68,810	4,013.92	.9263	3,718.09	4,197.41	.9263	3,888.06
March	93,781	5,470.56	.9366	5,123.73	5,720.64	.9366	5,357.95
April	80,555	4,699.04	.9483	4,456.10	4,913.86	.9483	4,659.81
May	83,520	4,872.00	.9529	4,642.53	5,094.72	.9529	4,854.76
June	13,109	764.69	.9160	700.46	799.65	.9160	732.48
July	12,711	741.47	.9137	677.48	775.37	.9137	708.46
August	14,837	865.49	.9114	788.81	905.06	.9114	824.87
September	18,703	1,091.01	.9067	989.22	1,140.88	.9067	1,034.44
October	16,625	969.79	.9020	874.75	1,014.13	.9020	914.75
November	12,285	716.62	.9001	645.03	749.39	.9001	674.53
December	7,241	422.39	.8979	379.26	441.70	.8979	396.60
January, 1928	9,191	536.14	.8920	478.24	560.65	.8920	500.10
February	7,844	457.57	.8120	371.55	478.48	.8120	388.53
March	8,041	469.06	.8342	391.29	490.50	.8342	409.18
April	8,435	492.04	.8385	412.58	514.54	.8385	431.44
May	12,508	729.63	.7683	560.57	762.98	.7683	586.20
June	14,878	867.88	.8034	697.25	907.55	.8034	729.13
July	13,712	799.87	.8098	647.73	836.43	.8098	677.34
August	13,491	786.97	.8230	647.68	822.95	.8230	677.29
September	11,760	686.00	.8113	556.55	717.36	.8113	581.99
October	9,445	550.96	.8321	458.45	576.15	.8321	479.41
November	5,444	317.58	.8520	270.58	332.08	.8520	282.93
December	5,699	332.45	.8611	286.27	347.63	.8611	299.34
January 1-15, 1929	1,222	71.29	.8502	60.61	74.54	.8502	63.37
	3,420,166	199,509.67		$169,117.52	208,630.13		$176,848.62

Schedule I
Sheet 2

FORD MOTOR COMPANY
DEPRECIATION COSTS OF FORD CAM SHAPERS; MODEL T-410 CAMSHAFTS

Thirteen machines at various costs and acquisition dates for the period from June 16, 1925 to January 15, 1929

Periods	Depreciation Rates	Depreciation	Per Cent Applicable to T-410	Amounts
June 16, 1925 to December 31, 1925 (6½ months)	9.5%	$3,650.36	100.	$ 3,650.36
Year 1926	9.5%	6,915.33	100.	6,915.33
Ten months ended October 31, 1927	10.5%	6,691.60	100.	6,691.60
November, 1927	10.5%	669.16	82.79	554.00
December, 1927	10.5%	669.16	51.81	346.69
Year 1928	10.5%	8,676.16	12.50	1,084.52
January 1-15, 1929	10.5%	373.08	1.66	6.19
Total				$19,248.69

Schedule I
Sheet 3

(4)

FORD MOTOR COMPANY
DEPRECIATION COSTS OF MELLING CAM LATHES; MODEL T-410 CAMSHAFTS

Sixteen Melling Cam Lathes, cost $65,351.07 for the period from June 16, 1925 to January 15, 1929

Periods	Depreciation Rates	Depreciation	Per Cent Applicable to T-410	Amounts
June 16, 1925 to December 31, 1925 (6½ months)	9.5%	$3,362.86	100.	$ 3,362.86
Year 1926	9.5%	6,208.35	100.	6,208.35
Ten months ended October 31, 1927	10.5%	5,718.22	100.	5,718.22
November, 1927	10.5%	571.82	82.79	473.41
December, 1927	10.5%	571.82	51.81	296.26
Year 1928	10.5%	6,861.86	12.50	857.73
January 1-15, 1929	10.5%	285.91	1.66	4.75
Totals				$16,921.58

Schedule I
Sheet 4

(5)

FORD MOTOR COMPANY

COMPARATIVE COSTS OF MAINTENANCE REPAIRS ON FORD CAM SHAPERS AND ON MELLING CAM LATHES

for the period from June 16, 1925 to May 31, 1927.

Shift Numbers	Number of Hours Worked	Number of Men in Maintenance Crew	Average Direct Labor Rates	Amounts
	Ford Cam Shapers			
1	1922	1	.8587	$ 1,650.42
2	1922	2	.8587	3,300.84
3	1922	2	.8587	3,300.84
	5766			$ 8,252.10
	Melling Cam Lathes			
1	1922	1	.8587	$ 1,650.42
2	1922	4	.8587	6,601.69
3	1922	4	.8587	6,601.69
	5766			$14,853.80

Schedule I
Sheet 5

FORD MOTOR COMPANY

COST OF EXTRAORDINARY REPAIRS ON MELLING CAM LATHES

Expenditures made in years 1928, 1929 and 1930

Work Order Numbers	Brass Tag Numbers	Dates of Work Orders	COSTS Material	Labor	Total	Explanations per Work Orders
R-26501	35472	Sep 9, 1929	$ 72.77	$ 1,306.78	$ 1,379.55	Move from K-7 Motor Building to B-58 Foundry. Overhaul for Operation No. 13; turn cams on A-6250 camshaft. 27 bronze bushings and 3 cast iron castings.
E-66375	36592	Jan 4, 1929	47.68	1,680.60	1,728.28	Move from K-7 to N-711-C Foundry Tool Room. Overhaul; to be repaired for A-6250. Make 20 bronze bushings and heat treat 2 AAA shafts.
E-34478	36552	Oct 1929	38.36	1,479.03	1,517.39	Move from K-7 Motor Building to B-58 Foundry. Overhaul for Operation No. 13; turn cams on A-6250 camshaft. Make 2 bronze bushings and 2 forgings.
R-26827	36928	Sep 9, 1929	62.53	1,744.11	1,806.64	Move from K-8 Motor Building to B-58 Foundry. Overhaul for Operation No. 13; turn cams on A-6250 camshaft; 6 bronze brackets. Make 27 bronze bushings.
R-34994	37754	Oct 1929	84.01	1,694.42	1,778.43	Move from K-7 to B-55. Make all necessary repairs. Make 43 bronze bushings; furnish one 8" x 6½" cast iron casting.
R-40938	38005	Apr 1930	59.00	2,730.75	2,789.75	Move from K-7 to B-58 Foundry. Overhaul for Operation No. 13; turn cams on A-6250 camshaft. Make 21 bronze bushings. Rework one gear to fit spindle.
R-58333	36451	Dec 5, 1928	58.71	1,798.04	1,856.75	Move to B-60 Foundry. Do all necessary repairs to put machine in first class shape. Make 21 bronze bushings. Heat treat 1 AAA shaft. Furnish 1 steel casting.
R-54299	37867	Mar 1930	65.59	1,648.05	1,713.64	Move from K-7 to B-58 Foundry. Overhaul for Operation No. 13. Turn cams on A-6250 camshaft. Make 21 bronze bushings.
R-19695	37732	Jul 2, 1929	57.35	1,253.19	1,310.54	Move from K-8 to B-60 Foundry. Overhaul for Operation No. 13. Turn cams on A-6250 camshaft. Make 20 bronze bushings. Furnish 2 iron castings.
E-69225	36848	May 4, 1929	83.15	1,820.86	1,904.01	Move from K-8 to Foundry Tool Room. Overhaul for shaping cams on A-6250. Make 21 bronze bushings. Furnish 3 castings. Heat treat 1 shaft.
E-48294	37657	Dec 3, 1928	85.79	1,743.40	1,829.19	Move from J-8 to Foundry Tool Room. Overhaul for shaping cams on A-6250. Make 19 bronze bushings. Make 4 cast iron castings.
R-70888	37501	Jun 1930	27.49	562.13	589.62	Overhaul. Move from B-63 Foundry to K-7 Motor Building. Make 15 bronze bushings.
R-7818	37501	Apr 2, 1929	83.98	1,830.87	1,914.85	Move from K-8 to B-59 Foundry. Overhaul and put in first class shape. Make 20 bronze bushings. Furnish 3 steel forgings.
E-66495	36496	Jan 4, 1929	55.12	1,405.90	1,461.02	Move from K-7 to Foundry Tool Room. Make all necessary repairs. Make 29 bronze bushings.
	Total		$881.53	$22,698.13	$23,579.66	

Schedule I
Sheet 6

FORD MOTOR COMPANY

COMPARATIVE COSTS OF CERTAIN OPERATIONS IN MACHINING MODEL A-6250 CAMSHAFTS

on Ford Cam Shapers and on Melling Cam Lathes
for the period from November 1, 1927 to February 3, 1931

	Debits	Credits
	Costs on Ford Cam Shapers	Costs on Melling Cam Lathes
Costs compared (a):		
Direct labor	$ 86,921.15	$101,108.05
Depreciation	31,728.94	27,645.49
Maintenance repairs	25,234.66	45,829.12
	$143,884.75	$174,582.66
*Loss** due to use of Melling cam lathes	—	*30,697.91*
	$143,884.75	$143,884.75
Cost per camshaft	$.0341	$.0413

(a) No cost records are available to show, by separate operations, the comparative power costs, tool costs, scrap losses or other incidental items.

* Words and figures in italics were red in the original.

Revised Schedule II
Sheet 1

FORD MOTOR COMPANY

COMPARATIVE COST OF DIRECT LABOR FOR TWO OPERATIONS ON MODEL A-6250 CAMSHAFTS ON FORD CAM SHAPERS AND MELLING CAM LATHES

for the period from November 1, 1927 to February 3, 1931

Periods	Production of Model A Camshafts	FORD CAM SHAPERS			MELLING CAM LATHES		
		Hours Required for Two Operations (Production multiplied by 1.3755 minutes or by .022925 hours)	Average Direct Labor Rates	Direct Labor Cost of Two Operations	Hours Required for Two Operations (Production multiplied by 1.60 minutes or by .0266667 hours)	Average Direct Labor Rates	Direct Labor Cost of Two Operations
November, 1927	2,553	58.53	$.9001	$ 52.68	68.08	$.9001	$ 61.28
December	6,734	154.38	.8979	138.62	179.57	.8979	161.24
January, 1928	13,509	309.69	.8920	276.24	360.24	.8920	321.34
February	19,512	447.31	.8120	363.22	520.32	.8120	422.50
March	32,295	740.36	.8342	617.61	861.20	.8342	718.41
April	44,503	1,020.23	.8385	855.46	1,186.75	.8385	995.09
May	55,306	1,267.89	.7683	974.12	1,474.83	.7683	1,133.11
June	67,866	1,555.83	.8034	1,249.95	1,809.76	.8034	1,453.96
July	69,537	1,594.14	.8098	1,290.93	1,854.32	.8098	1,501.63
August	96,098	2,203.05	.8230	1,813.11	2,562.62	.8230	2,109.04
September	89,353	2,048.42	.8113	1,661.88	2,382.75	.8113	1,933.13
October	117,348	2,690.20	.8321	2,238.52	3,129.28	.8321	2,603.87
November	118,145	2,708.47	.8520	2,307.62	3,150.54	.8520	2,684.26
December	119,984	2,750.63	.8611	2,368.57	3,199.58	.8611	2,755.16
January, 1929	165,184	3,786.84	.8502	3,219.57	4,404.91	.8502	3,745.06
February	160,960	3,690.01	.8414	3,104.77	4,292.27	.8414	3,611.52
March	175,960	4,033.88	.8667	3,496.16	4,692.27	.8667	4,066.79
April	180,249	4,132.21	.8793	3,633.45	4,806.65	.8793	4,226.49
May	194,724	4,464.05	.8821	3,937.74	5,192.65	.8821	4,580.44
June	186,277	4,270.40	.8936	3,816.03	4,967.39	.8936	4,438.86
July	198,713	4,555.50	.8914	4,060.77	5,299.02	.8914	4,723.55
August	198,044	4,540.16	.8962	4,068.89	5,281.18	.8962	4,732.99
September	154,561	3,543.31	.9005	3,190.75	4,121.63	.9005	3,711.53
October	174,545	4,001.44	.9085	3,635.31	4,654.54	.9085	4,228.65
November	109,155	2,502.38	.9092	2,275.16	2,910.80	.9092	2,646.50
December	63,601	1,458.05	.9792	1,427.72	1,696.03	.9792	1,660.75
January, 1930	90,529	2,075.38	.9797	2,033.25	2,414.11	.9797	2,365.10
February	114,714	2,629.82	.9716	2,555.13	3,059.04	.9716	2,972.16
March	156,386	3,585.15	.9626	3,451.07	4,170.30	.9626	4,014.33
April	192,275	4,407.90	.9480	4,178.69	5,127.34	.9480	4,860.72
May	186,961	4,286.08	.9298	3,985.20	4,985.63	.9298	4,635.64
June	169,489	3,885.54	.9386	3,646.97	4,519.71	.9386	4,242.20
July	56,702	1,299.89	.9648	1,254.13	1,512.06	.9648	1,458.84
August	103,200	2,365.86	.9617	2,275.25	2,752.00	.9617	2,646.60
September	94,616	2,169.07	.9630	2,088.81	2,523.10	.9630	2,429.75
October	79,907	1,831.87	.9633	1,764.64	2,130.86	.9633	2,052.66
November	73,022	1,674.03	.9637	1,613.26	1,947.26	.9637	1,876.58
December	52,616	1,206.22	.9636	1,162.31	1,403.10	.9636	1,352.03
January, 1931	32,700	749.65	.9650	723.41	872.00	.9650	841.48
February 2 and 3	5,166	118.43	.9641	114.18	137.76	.9641	132.81
	4,222,999	96,812.25		$86,921.15	112,613.45		$101,108.05

Revised Schedule II
Sheet 2

FORD MOTOR COMPANY

DEPRECIATION COSTS OF FORD CAM SHAPERS; MODEL A-6250 CAMSHAFTS

for the period from November 1, 1927 to January 31, 1931

Periods	Depreciation Rates	Depreciation	Per Cent Applicable to A-6250	Amounts
November, 1927	10.5%	$ 669.16	17.21	$ 115.16
December, 1927	10.5%	669.16	48.19	322.47
Year 1928	10.5%	8,676.16	87.50	7,591.64
January 1-15, 1929	10.5%	482.78	98.34	474.77
January 15-31, 1929	10.5%	482.78	100.	482.78
Eleven months ended December 31, 1929	10.5%	10,621.15	100.	10,621.15
Year 1930	10.5%	11,324.35	100.	11,324.35
January, 1931	9. %	796.62	100.	796.62
Total				$31,728.94

Schedule II
Sheet 3

FORD MOTOR COMPANY

DEPRECIATION COSTS OF MELLING CAM LATHES; MODEL A-6250 CAMSHAFTS

for the period from November 1, 1927 to January 31, 1931

Periods	Depreciation Rates	Depreciation	Per Cent Applicable to A-6250	Amounts
November, 1927	10.5%	$ 571.82	17.21	$ 98.41
December, 1927	10.5%	571.82	48.19	275.56
Year 1928	10.5%	6,861.85	87.50	6,004.12
January 1-15, 1929	10.5%	414.63	98.34	407.75
January 16-31, 1929	10.5%	414.63	100.	414.63
Eleven months ended December 31, 1929	10.5%	9,121.81	100.	9,121.81
Year 1930	10.5%	10,568.33	100.	10,568.33
January, 1931	9. %	754.88	100.	754.88
Total				$27,645.49

Schedule II
Sheet 4

FORD MOTOR COMPANY

COMPARATIVE COSTS OF MAINTENANCE REPAIRS ON FORD CAM SHAPERS AND ON MELLING CAM LATHES

for the period from November 1, 1927 to February 3, 1931

FORD CAM SHAPERS

Shift Numbers	Number of Shifts Worked	Number of Hours at Eight Hours per Shift	Number of Men in Maintenance Crew	Average Direct Labor Rates	Amounts
1	648	5184	1	.8951	$ 4,640.20
2	730	5840	2	.8951	10,454.77
3	708	5664	2	.8951	10,139.69
					$25,234.66

MELLING CAM LATHES

1	648	5184	1	.8951	$ 4,640.20
2	730	5840	4	.8951	20,909.54
3	708	5664	4	.8951	20,279.38
					$45,829.12

Schedule II
Sheet 5

FORD MOTOR COMPANY

COMPUTATIONS OF LOSSES DUE TO USE OF MELLING CAM LATHES FOR MACHINING MODEL F-446 CAMSHAFTS WHEN COMPARED WITH OTHER AVAILABLE MACHINES AND METHODS

for the period from June 16, 1925 to March 31, 1928

	Number of Camshafts Produced	Losses Per Camshaft	*Losses**
Losses due to use of Melling cam lathes:			
Compared with use of Ford cam shapers on Model T-410 production	3,420,166	$.0104	*$35,585.35*
Applied to Model F-446 production	275,664	.0104	*$ 2,866.91*
Compared with use of Ford cam shapers on Model A-6250 production	4,222,999	.0073	*$30,697.91*
Applied to Model F-446 production	275,664	.0073	*$ 2,012.35*

* * * * *

Revised Schedule IV

(17)

* Words and figures in italics were red in the original.

2. (a) In preparing its Schedule I, defendant has relied upon the cost of machining the cams of the Model T-410 camshafts on the machines known as the Ford cam shapers used for many years in the plant of the defendant Ford Motor Company.

2. (b) In preparing its Schedule II defendant has computed the cost of machining the cams of the Model A-6250 camshafts on Ford cam shapers of the type regularly used by defendant in its plant for machining Model T-410 camshafts.

* * * * *

2. (c) In preparing its Schedule IV defendant has relied upon the cost of using a Ford cam shaper computed from established comparative costs of the use of these shapers on Model T-410 shafts and Model A-6250 shafts as a standard of comparison. * * * * *

3. Paragraph No. 3 is fully answered by the answers to paragraph No. 2 hereof.

4. Answering paragraph 4, the Ford cam shaper employed by defendant as its standard of comparison is fully identified and described in paragraph 25 of Defendant's Statement of Account filed herein on September 27, 1937.

(18)

* * * * * No Ford cam shapers such as used by defendant Ford Motor Company are now in existence in so far as any present knowledge of defendant is concerned.

5. The following are the means and method by which defendant has arrived at all costs with respect to the standards of comparison used in the statement of account filed in response to paragraph 1 hereof, the summary cost schedules being set forth in answer to paragraph 1.

DESCRIPTION OF MEANS AND METHOD USED IN COMPUTING SCHEDULE I.

Direct Labor: The difference in cost of direct labor ($169,117.52 for Ford cam shapers and $176,848.62 for Melling cam lathes) for the period from June 16, 1925 to January 15, 1929 is based upon the difference in time required to put a camshaft through the comparative operations as follows:

Operations	Minutes Required	
	Ford Cam Shaper	Melling Cam Lathe
Straightening	-0-	.50
Shape or turn cams (one man operating two machines)	1.20	.86
Finish grind cams	2.30	2.30
	3.50	3.66

(19)

The operations for the Ford cam shaper were obtained from an operation report noted in a note book kept by foreman Spencer W. Libby. The approximate date of the report is April 1924.

The operations for the Melling cam lathe were obtained from operation sheet dated October 8, 1924 prepared by Victor F. Marentette of the Time Study Department.

The straightening operation was required before the shafts were placed in the Melling cam lathes, but not before being placed in the Ford cam shapers, because of the difference in the construction and the difference in operations of the two machines.

The foregoing minutes required to put one camshaft through the comparative operations were converted into fractions of hours and then multiplied by the monthly production of camshafts to arrive at the hours required each month to turn out the production. The hours required to turn out each month's production were then multiplied by the monthly average direct labor rates of Department 410 to arrive at the direct labor cost.

Depreciation: The comparative depreciation costs of the Ford cam shapers amounting to $19,248.69 and of the Melling cam lathes amounting to $16,921.58 were determined as follows:

The same depreciation rates were used for both types of machines. The rates are those allowed to the Ford Motor Company by the Treasury Department for federal income tax computations and are 9.5 per cent for the years 1920 to 1926 and 10.5 per cent for the years 1927 to 1930, inclusive.

The same period was used in both computations, that is, from June 16, 1925 to January 15, 1929. The entire depreciation cost of the machines was not used beginning in November 1927 because from that time to the end of the period both Model T and **(20)** Model A camshafts were produced. The depreciation for the period from November 1, 1927 to January 15, 1929 was prorated between the Model T and Model A camshaft cost computations on the basis of the number of camshafts produced.

The depreciation on the Melling cam lathes was computed on the original cost less 2 per cent discount plus installation costs and additions for sixteen machines.

The depreciation on the Ford cam shapers was computed on the original cost plus installation costs and additions for thirteen machines. Since some of the Ford cam shapers became fully depreciated during the period under review it was necessary to include in the computation the cost of a new machine at the last known cost for each old machine as it became fully depreciated. In this way depreciation was computed on thirteen machines at all times.

Maintenance and Repairs: The difference between the maintenance repairs of the Ford cam shapers amounting to $8,252.10 and the maintenance repairs of the Melling cam Lathes amounting to $14,853.80 is due to the fact that two maintenance men were required for the Ford cam shapers on each of the second and third shifts, while four maintenance men were required for the Melling cam lathes on the same two shifts. One maintenance man was required on the first shift, or midnight shift, for each type of machine.

The Ford cam shapers were overhauled by the maintenance men on the average of one machine per month or approximately every machine once a year. The Melling cam lathes were cleaned and freed of chips on the average of one machine each day or about twice a month for each machine.

(21)

The period covered by the computation is from June 16, 1925 to May 31, 1927. The May 31st date has been used as the end of the period because May was the last month in which Model T camshafts were produced in any great quantity, and therefore the last month full maintenance crews were required.

No records are available which would show the number of hours, or the number of shifts, the Melling cam lathes were operated during the period under review. An operation sheet dated October 8, 1924 gives the time of .86 minutes required for one man operating two machines to turn one camshaft on the Melling cam lathes. The .86 minutes converted into hours equals .0143 hours. Since eight men, each operating two machines, worked in this department, it would take the entire department .0143 hours divided by eight or .0018 hours to turn one camshaft. Knowing the time required for the department to turn one camshaft, that time was multiplied by the total production of Model T camshafts during the period from June 16, 1925 to May 31, 1927, 3,202,985 pieces, and the total of 5,766 hours the department must have worked was thus determined. The 5,766 hours was then divided by three, on the basis of three shift operations at all times during the period. The number of hours worked by each shift was then multiplied by the number of maintenance men required each shift on each type of machine to arrive at the total maintenance man-hours required to maintain the

machines each shift. And, finally, the maintenance man-hours were multiplied by the average direct labor rate for Department 410 during the period under review to arrive at the total dollar cost for maintaining each type of machine.

(22)

DESCRIPTION OF MEANS AND METHOD USED IN COMPUTING SCHEDULE II.

Direct Labor: The difference in cost of direct labor ($86,921.15 for Ford cam shapers and $101,108.05 for Melling cam lathes) for the period from November 1, 1927 to February 3, 1931 is based upon the difference in time required to put a camshaft through comparative operations as follows:

Operations	Minutes Required	
	Ford Cam Shaper	Melling Cam Lathe
Straightening (one man operating one press)	-0-	.60
Shape or turn cams (one man operating two machines)	1.3755	1.00
	1.3755	1.60

The minutes for the Melling cam lathe have been determined from Engineering operation sheets prepared at the time the Russian government through Autostroy Corporation was obtaining information in order to set up an automobile plant in Russia. See Exhibit 18 attached, which is also Defendant's Exhibit 214. The .60 minutes for straightening has been determined by converting the operation number 12, which is "Straighten" on "Hand Press" 100 pieces per hour. The 1 minute for turning has been determined by converting the operation number 13, which is "Turn Cam" on "Milling Cam Lathe" 30 pieces per hour. This latter operation was performed on the Melling cam lathe. **(23)**

In comparing the operations required if Ford cam shapers had been used, it appears that as no straightening operation was required for shaping the model T-410 camshaft, none would be required for the A-6250 camshaft;

hence, no time for straightening has been included in computing the cost of shaping Model A camshafts.

The time of 1.3755 minutes for shaping cams on Ford cam shapers has been determined from the computation by Mr. William F. Pioch set forth in Defendant's Exhibit 264 which shows that one rotation of the model T camshaft in the Ford cam shaper took 25.3 seconds whereas the model A camshaft would have taken 29 seconds. The proportionate increase from 25.3 to 29 applied to the 1.20 minutes for shaping model T camshafts, per Exhibit 13, results in the amount of 1.3755 minutes for shaping model A camshafts.

The foregoing minutes required to put one camshaft through the comparative operations were converted into fractions of hours and then multiplied by the monthly production of camshafts to arrive at the hours required each month to turn out the production. The hours required to turn out each month's production were then multiplied by the monthly average labor rates of Department 410 to arrive at the direct labor cost.

Depreciation: The comparative depreciation costs of the Ford cam shapers amounting to $31,728.94 and of the Melling cam lathes amounting to $27,645.49 were determined as follows:

The same depreciation rates were used for both types of machines. The rates are those allowed to the Ford Motor Company **(24)** by the Treasury Department for federal income tax computations and are 10.5 per cent for the years 1927 to 1930 and 9 per cent for the year 1931.

The same period was used in both computations, that is, November 1, 1927 to January 31, 1931.

The depreciation expense on the Melling cam lathes was computed on the cost of 16 machines from November 1, 1927 to January 3, 1929 when the first of 6 more Melling cam lathes was purchased. From January 3, 1929 to January 31, 1931 depreciation was computed on the cost of 17 to 22 machines.

The depreciation expense on the Ford cam shapers was computed on the cost of 13 machines from November 1, 1927 to January 3, 1929. From January 3, 1929 to January 31, 1931 depreciation was computed on the cost of 14 to

18 machines. The 5 more shapers were added on the same dates that the first 5 of the 6 Melling cam lathes were acquired. Only 5 shapers were added in order to maintain the same ratio between shapers and lathes, that is 13 to 16. In other words, for every Melling cam lathe acquired, it requires only .8126 of a shaper. The addition of the 6 Melling cam lathes requires the addition of 4.8756 Ford cam shapers. The last available cost was used as the cost of the additional shapers.

Maintenance and Repairs: The difference between the maintenance repairs of the Ford cam shapers amounting to $25,234.66 and the maintenance repairs of the Melling cam lathes amounting to $45,829.12 is due to the fact that two maintenance men were required for the Ford cam shapers on each of the second and third shifts, while four maintenance men were required for the Melling **(25)** cam lathes on the same two shifts. One maintenance man was required on the first shift, or midnight shift for each type of machine.

The Ford cam shapers were overhauled by the maintenance men on the average of one machine per month or approximately every machine once a year. The Melling cam lathes were cleaned and freed of chips on the average of one machine each day or about twice a month for each machine.

The numbers of maintenance men used throughout this computation, that is 2 and 4, are based upon the maintenance of 13 Ford cam shapers and 16 Melling cam lathes. During the year 1929 six more Melling cam lathes were acquired and for the depreciation computation five more Ford cam shapers were added. On a comparative basis the additional maintenance men that should have been required were .77 for the shapers and 1.5 for the lathes. The net difference for these additional men is .73. Since the difference is less than one man, no attempt has been made to adjust the computation.

The period covered by the computation is from November 1, 1927 to February 3, 1931. The number of hours worked by the maintenance crews was determined by multiplying the number of shifts worked by eight hours. The number of shifts worked was obtained from "Minute Cost Summaries," form 2202-B. The number of hours

worked by the maintenance crews, times the number of men in each crew, times the average direct labor rate for the period under review, equals the total maintenance cost.

(26)

* * * * *

8. Defendant has disposed of the infringing machines as follows:

Brass Tag Numbers	Dates of Disposition	Disposition
32067	November 9, 1928	Sold to Ford Motor Company, Cork, Ireland at book value
35472	June 18, 1931	Salvaged
36386	June 18, 1931	Salvaged
36451	June 18, 1931	Salvaged
36496	June 18, 1931	Salvaged
36552	June 18, 1931	Salvaged
36592	June 18, 1931	Salvaged
36848	June 18, 1931	Salvaged
36928	June 18, 1931	Salvaged
37501	June 18, 1931	Salvaged
37657	June 18, 1931	Salvaged
37754	June 18, 1931	Salvaged
37732	June 18, 1931	Salvaged
37844	June 18, 1931	Salvaged
37867	June 18, 1931	Salvaged
38005	June 18, 1931	Salvaged
37001	November 9, 1928	Sold to Ford Motor Company, Cork, Ireland at book value
38080	January 4, 1929	Sold to Continental Motors Corporation, Muskegon, Michigan for $2,200. Repurchased March 20, 1931
	June 8, 1936	Salvaged
57219	November 22, 1934	Salvaged
57220	June 8, 1936	Salvaged
57945	November 22, 1934	Salvaged
57903	November 22, 1934	Salvaged
57960	November 22, 1934	Salvaged
57578	Now available at Highland Park Plant	

9. As stated in answer to paragraph 12 in Defendant's Statement of Account filed on September 27, 1937, certain of the infringing machines were converted for turning the pump eccentrics of the Ford V-8 camshafts and were in use for the period from March, 1932, until the Fall of 1934. Defendant's records do not clearly identify which of these machines were so converted, but due to the fact that machines **(30)** bearing Brass Tag Nos. 57219, 57220, 57945, 57903, 57960 and 57578 were not salvaged until 1934 and 1936, it appears that these are the machines that were so converted. No change in the valuation record was made in defendant's regular system of accounting for value of these machines after such conversion.

10. During the period from January 1, 1923 to January 1, 1924 defendant produced approximately 105,797 tractor camshafts, all of which were rough ground. This figure is obtained by taking the motor numbers on tractors produced during such period and adding an approximate amount of 4,029 tractor camshafts which in all probability were produced and sold by defendant Ford Motor Company for service sales and replacements. The number of grinding wheels used by defendant during such period for the rough grinding of this number of tractor camshafts is estimated as 240 and the cost of such wheels is estimated as 240 x $7.50=$1,800.00.

FORD MOTOR COMPANY,
By B. J. CRAIG (signed)
Secretary.

(31)

(Ptf. Rec. Vol. III from page 34, line 26 to page 37, line 3 inclusive of Typewritten Transcript.)

Mr. Spohn: Now with respect to the defendant's further statement of account which has been identified for the purposes of cross examination as Exhibit C, the plaintiff **(35)** denies all the material in paragraph 1, page 1, denies all the material on schedule 1, sheet 1, and the whole page. Denies all of the material on schedule 1, sheet 2, page 3. Denies all of the material on sheet 3 of schedule 1, page 4 of the report. Denies all of the material on sheet 4 of schedule 1, page 5, of the report. Denies all of the material, sheet 5, sched-

ule 1, page 6. Denies all of the material on sheet 6, schedule 1, page 7. Denies all of the material on sheet 1, schedule 2, page 8. Denies all of the material, sheet 2, schedule 2, page 9. Denies all of the material, sheet 3, schedule 2, page 10. Denies all of the material, sheet 4, schedule 2, page 11. Denies all of the material, sheet 5, schedule 2, page 12. * * * Denies all of the material, schedule 4, page 17. Admits defendant's answer 2-A, in parentheses, on page 18, and denies defendant's answers 2-B and 2-C, appearing on page 18, and denies the answer to paragraph 3 appearing on page 18. Accepts the answer to the first sentence of paragraph 4 appearing on page 18. * * *

(36) Denies the answer to paragraph 5 appearing on page 19 and all the material, including the heading reading as follows, and thereafter set forth on that page: "Description of means and methods used in computing schedule 1."

Denies all the material appearing on pages 20, 21, 22, 23, 24, 25 and 26 * * *.

Plaintiff rejects Exhibits 13 and 14 referred to in the answer to paragraph 7 appearing on page 29, also rejects the following portion of that answer, (b) model a cam shaft—is attached hereto marked Exhibit 16, and (c) tractor cam shafts—is attached hereto marked Exhibit 17.

Plaintiff also denies and rejects so much of the following sentence as refers to Exhibits 13, 14, 16 and 17: "The operation sheets attached hereto and marked Exhibits 13 to 17, inclusive, are the only operation sheets which could be found after a most exhaustive search through all available records of defendant."

Plaintiff rejects the last sentence of the answer appearing on page 29, commencing with the words: "Exhibit 13," and except as herein qualified and rejected, plaintiff accepts the answer.

Plaintiff accepts defendant's answer to question 8 appearing on page 30. Also the plaintiff accepts the defendant's **(37)** answer to question 9 appearing on page 30.

Plaintiff also accepts defendant's answer to question 10 appearing on page 31.

TRANSCRIPT OF TESTIMONY.

Designated By Both Plaintiff and Defendant.

Proceedings had and testimony taken in the above-entitled cause, before DONALD L. QUAIFE, ESQ., Special Master, at Detroit, Michigan, commencing Thursday, March 17, 1938.

APPEARANCES:

MESSRS. LECHER, MICHAEL, WHYTE & SPOHN,
(Mr. John W. Michael, Mr. George D. Spohn and Mr. B. D. Watts, appearing),

Appearing on behalf of the Plaintiff.

MESSRS. BODMAN, LONGLEY, BOGLE, MIDDLETON & FARLEY,
(Mr. I. Jos. Farley, appearing),

Appearing on behalf of the Defendant.

PLAINTIFF'S RECORD.

(3)* FRED M. HOVIS was thereupon called as a witness, and having been first duly sworn, testified as follows:

CROSS EXAMINATION by Mr. Spohn.

Q. How do you spell your name? A. H-o-v-i-s.

Q. And your first name? A. Fred.

Q. And where do you reside, Mr. Hovis? A. 14678 Grandmont.

Q. That is in the City of Detroit? A. That is right.

Q. What is your occupation? A. Cost Accountant.

Q. And for whom? A. Ford Motor Company.

Q. And how long have you been employed by the Ford Motor Company? A. Twenty years.

Q. Are you a certified public accountant? A. No, sir.

Q. And during that twenty years of time have you been employed continuously by the Ford Motor Company? **(4)** A. Yes, sir.

Q. And have you had any outside employment other than that with the Ford Motor Company? A. No, sir.

Q. And will you state generally what your duties as cost accountant have been with the Ford Motor Company during that period of time? A. The object of a cost accountant out there is to compile costs on parts which are

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*Figures in boldface type in parentheses indicate original pagination.

later to be assembled into a built-up automobile, and are to be generally used for costing sales and for setting selling prices.

Q. Do you have charge of the cost department? A. No, sir.

Q. Who does have charge of the cost department? A. Mr. Martindale.

Q. Other than Mr. Martindale and you, are there any other employees in the cost department? A. Yes, sir.

Q. And how many? A. About sixteen.

Q. And has that cost department been in existence all during the twenty years that you have been with the company? A. Yes, sir.

Q. What would you say with respect to the number of employees in the cost department from 1925 to 1931, if you have any memory on that point? A. It would be just about the same, although we have made some additions such as steel mills and rolling mills, which would (5) mean a little more clerical work, but probably there may be one or two more men now than there was then.

Q. Particularly, what were your duties in that department during that period of time? A. Well, when I first started in I started in on writing operation sheets, the different operations on the parts.

Q. Writing them? A. Writing them, yes, and that probably took up, oh, a year or more, and from that time on it was compiling costs, nothing else but that, overhead, and so forth, that have to do with costs, of course.

Q. And how were these cost figures used after you compiled them? A. Well, just as I say, they would be used for costing sales primarily and for setting selling prices on built-up automobiles.

Q. On the completed automobile? A. The completed automobile.

Q. And would those cost studies be used in costing sales for replacement parts too? A. Yes, they would.

Q. Is your cost system a regular part of the accounting records of the Ford Motor Company? A. Yes.

Q. Are permanent records kept of those cost figures? A. For a certain length of time.

Q. And for how long would that time be? A. On different records for different lengths of time. Possibly there isn't any set length of time on anything, it is just,—

(6) when we figure we haven't any more room for filing space they do away with a certain amount of it.

Q. Now, when you were compiling costs did you make permanent bound books of those cost figures? A. No, sir.

Q. Were they compiled just on loose-leaf sheets? A. No, compiled on cards, separate card for each part.

Q. A separate card for each part? A. That is right.

Q. And your costs of sales were determined with reference to these cards, were they? A. No, not necessarily. These cards would be used for assembling, for instance, a major assembly, a door, or something like that; why, we would set up the name of the assembly and then the parts contained therein and post from the cost cards onto this sheet and finally total them up to get the cost of the assembly.

Q. That would be a summary cost sheet, would it? A. That would be a summary cost sheet.

Q. But it would be a summary of all these individual cards? A. That is right. You see, it is impossible to cost sales every month completely, that is to cost all the parts. It can not be done, the volume of work is too much. The way that is done is a complete cost is figured periodically and a percentage for that particular month is made of the cost to the sales, and of course the sales are kept monthly and the cost is arrived at by applying this percentage of the sales to arrive at the cost, and after a certain period of time, why, (7) another cost is compiled to arrive at a new percentage.

* * * * *

Q. (By Mr. Spohn): Now then, as I understand your testimony, costs, cost studies are made periodically, are they not? A. That is right.

Q. And whatever cost figure you get when you make it periodically it obtains until you derive another one sometime later? A. That is right.

Q. And when you make your cost studies, what do you include in cost? A. Material, the direct labor which represents the labor of direct operations on the part and overhead, which takes in non-productive labor, and other elements of course.

Q. Is that done for each part? A. That is done for each part, yes, sir.

Q. Assuming that a part would have several operations in it, will you explain how you prepare cost records for that operation? A. We do not prepare costs by operations. We take the total direct labor chargeable against a part for a month, all direct labor is charged against this part and a record of the production (8) kept. The direct labor is divided by the production which gives us a minute cost for the part, including all operations, then of course this part is performed in a certain department, we have an average labor rate for that department. The average labor rate is applied on the minute cost per part, which gives us a labor cost per part, including all operations. Upon that labor against the part is applied the overhead percentage, the overhead percentage is arrived at by departmentally taking the total expenses or overhead and dividing by the total production labor. Of course when we apply this overhead percentage on the production labor for the part, why, that gives us the overhead for the part.

Q. What elements of expense are included in overhead, in your cost system? A. Well, there is non-productive labor, depreciation.

Q. Depreciation on what? A. On equipment, buildings, durable tools, machinery, land improvements, that is about all.

Q. What other items? A. Non-productive labor, maintenance, repairs, general expense such as general office expense, and so forth.

Q. Administrative expense? A. Administrative expense.

Q. Taxes? A. Taxes, yes, sir.

Q. Real estate taxes? A. Yes.

(9) Q. Personal property taxes? A. Yes.

Q. Now, in your cost-keeping during the period that you have been employed, you make a card for each part? A. That is right.

Q. At periods? A. That is right.

Q. And those cards are periodically re-checked, is that the fact? A. Well, a card is designed so it will take care of several months' costs, and the same card is used, of course; it is dated at the time they figure a cost and also dated the next time they figure a cost.

Q. And the next re-computation is put on the same card, is it? A. The same card, if there is still room for it. If there isn't we take a new card, of course.

* * * * *

(17) Q. (By Mr. Spohn): I call your attention to Exhibit 6 attached to and a part of Exhibit "A," and ask you to explain that Exhibit. A. Well, this is a photostatic copy of a cost card for the "A" camshaft. This particular part was produced in the rolling mill originally and the cost, the rolling mill cost per hundredweight of steel was transferred to this card and when multiplied by the weight of the part gives you the material cost here, and the additional figures here represent departments, individual departments in which—

Q. (Interposing): Just a moment. When you say "the figures here," you are referring to the column of figures on the left-hand side of Exhibit 6? A. Under "Department." Each one of those figures like 184, 1514, the "H. T." represents "Heat Treat," and "410" represents the camshaft department. Now, in each one of those departments certain operations were performed, and the labor and burden cost for those accumulated operations in each one of those departments was posted under labor and burden, and **(18)** the total of course represents the total material, labor and overhead cost, and shipping expense is arrived at on the basis of a percentage. It was at that time. The way costs are compiled now, this shipping expense comes right in the overhead in the general percentage.

Q. What kind of shipping expense, is that shipping in or out? A. Shipping out.

Q. Shipping out? A. Yes.

Q. Now, that card, Exhibit 6, covers two months, does it not, May and July of 1929? A. That is right.

Q. And it is a summary month card, is it a month's operation in those various departments? A. A month's operations, yes.

Q. And your testimony is that cost summaries like that were made at frequent intervals? A. That is right.

* * * * *

(19) Q. Does your department determine the burden figures for the particular month involved? A. Yes, sir.

Q. Is that a part of your duties? A. Yes, sir.

* * * * *

(23) Q. I refer you to Exhibit 10, in Exhibit "A," and ask you what that Exhibit is, appearing to be two cards, material price cards? A. These are cards that are kept by the pricing division where the requisitions are priced. This is a record of purchase order numbers, quantities and purchase order prices.

(24) Q. Those cards kept in your division? A. In the same division, yes, the pricing division is a division of the accounting department.

* * * * *

Q. Referring now specifically to Exhibit 10, to those purchase cards,—are those photostats of original cards? A. Yes, sir.

Q. And those cards are still in the possession, the originals are, of the defendant, the Ford Motor Company? A. That is right.

(25) Q. And they are in your division? A. That is right, I have them here.

Q. What does unit cost mean as found on those cards? A. Cost per piece.

Q. Cost per piece? A. That is right.

Q. And is the same thing true with respect to the second card appearing on Exhibit 10? A. That is right.

Q. Now I refer you to Exhibit 11, attached to Exhibit "A," entitled "Computation of Certain Items of Cost of Gordon Lathe Operation on Tractor Camshafts." Did you prepare that Exhibit? A. Yes, sir.

Q. All of it? A. In Section "C" here, rate of production, 5 shafts per hour, I did not—

Q. (Interposing): You did not compile that information? A. No, sir.

Q. From whom did you receive it? A. Mr. Farley. Paragraph 2, this is, 2 tool men, I didn't get that.

Q. From whom did you get that information? A. Mr. Farley. Production, 5 pieces per hour, that is from Mr. Farley. Cost of scrapping due to defective work, 60 per cent; I did not get that.

Q. Where did you get that information? A. Mr. Farley.

(26) Q. Now, I refer you to Exhibit 12, attached to Exhibit "A," entitled "Computation of Certain Costs Involved in Rough-Grinding Operation on Tractor Camshafts by Landis 10 by 36 Grinders During Period July 1, 1925, to January 1, 1928," and ask you if you prepared that Exhibit? A. On section "D" here, production per man, 8 shafts, I got that from Mr. Farley. Cost of grinding wheels, $7.50, I got that from Mr. Farley. Life of grinding wheel, 65 hours, came from Mr. Farley. Camshaft output in 65 hours, that came from Mr. Farley. That is all.

Q. The recapitulation of this Exhibit you prepared, however? A. That is right.

Q. Now with respect to Exhibits 8, 9, 10, 11 and 12, attached to Exhibit "A," do your own cost records that you have out there give you information from which you could compile the information secured from Mr. Farley? A. Partially.

Q. But you yourself did not compile that information? A. Not all of it.

Q. To what extent were those records incomplete as to that they would not furnish that information? A. Well, the information that we got from Mr. Farley?

Q. All that information you couldn't get from your own costs— A. (Interposing): No, sir.

Q. None of it? A. None of it, the cost accounting department has no information regarding operation cost such as maintenance, production, repairs, or anything like that, of direct operation, or (27) machine costs or expenses; we do not have anything like that all.

Q. All you have is cost summary cards? A. All we have is cost summary cards, which represent the cost of all the operations, not individual operations. In order to break it down and get the cost of a certain operation, we would have to get estimates or something on the production and maintenance and so forth for the individual machines.

Q. Would your records indicate production per hour? A. By machines?

Q. Yes. A. No, sir.

Q. By departments would it? A. By departments, which represent all operations. The only thing the cost department is interested in is getting a complete cost on the part, not in individual operation costs; we would have no

use for it. We use the complete cost on the part to apply against the part when it is assembled into a complete automobile.

Q. Does your depreciation on machinery and equipment depend upon operating hours? A. No, sir.

Q. It does not? A. It is applied on cost, depreciation is figured on cost.

Q. But over what life? A. Well, in this particular case it is the life of eight years.

Q. Not based on a machine hour, man hour rate? A. No, sir.

* * * * *

(30) Q. Now with respect to Exhibit 6, attached to and forming a part of Exhibit "A," cost summary sheet on a camshaft. A. Yes.

Q. That is the only cost summary sheet you have been able to find, is it, for camshafts? A. Just this one?

Q. Yes. A. No, I think we have two or three others besides this; this is an example, I think, this was supposed to represent.

Q. Do you have those others with you? A. I think we have.

Q. May we see those others? A. Yes. Model A cost cards, we have one here only.

Mr. Farley (Producing cards): Let Mr. Hovis look at these.

A. (Referring to cards): That is the original of this one, and here is a couple more of the "A." Here are some on the "B."

Q. (By Mr. Spohn): Some on the what? A. The prefix "B."

Q. What does that prefix "B" have reference to? A. I think it is due to a slight change in design, the same shaft, but due to some slight engineering change.

Q. Now, these cards that you have just handed me, may I have those marked for the purpose of identification?

Mr. Farley: These are original cards of the company, and while we are perfectly willing to have them for inspection **(31)** and all that sort of thing, we would like the privilege of substituting photostatic copies for the original, and I assume there will be no objection as far as counsel is concerned.

Mr. Spohn: No objection.

The Master: That will be taken care of.

(Documents were thereupon marked Exhibits D and E.)

Q. (By Mr. Spohn): Exhibits D and E have been marked with symbols A-2650 A and 1, are these two sheets tentatively marked for identification as Exhibits D and E, cost sheets, comparable to Exhibit 6, attached to and forming a part of Exhibit "A"? A. That is right.

Mr. Farley: Might I have the dates of those so we can know what periods they cover?

Q. (By Mr. Spohn): Exhibit E purports to cover the months of May and August, 1930; would you state that is correct? A. Also on the other side.

Q. On the face of the Exhibit, and on the reverse side purports to cover the months of October— A. 1930.

Q. And March of 1931, that is the fact? A. That is right.

Q. And the Exhibit, the card marked for identification as Exhibit D, on the face of the card purports to cover January of 1930 and March of 1930, is that a fact? A. That is right.

(32) Q. And on the reverse side the months of— A. This is marked September, I would say September and October.

Q. Of 1929? A. That is right.

Q. September and October of 1929? A. That is right.

(Documents were thereupon marked Exhibits F, G, H and I.)

Q. And the card that has been marked for identification as Exhibit E-1.

(A document was thereupon marked Exhibit E-1.)

* * * * *

(34) Q. Now I show you cards designated as Exhibits F, F-1, F-2, F-3, F-4, F-5, F-6, F-7, and F-8, which have just been produced at this hearing, and ask you what those Exhibits are, they being cards? **(35)** A. They represent individual costs on camshafts, 410 department, "T" model camshaft.

Q. I call your attention to Exhibit F, that Exhibit covers the months January to June, of 1923, inclusive, is that right? A. That is right.

Q. And Exhibit F-1 covers the months of July to November, inclusive, is it, of 1923? A. That is right.

Q. And Exhibit F and Exhibit F-1 relate to the "T" model camshaft cost? A. That is right.

* * * * *

(37) Q. Referring now to Exhibits E-1 and E and Exhibit D, being cost cards on the A model, these cost cards set forth certain burden figures, do they not, for the months therein involved? A. That is right.

Q. Do you have cost records anywhere indicating the component elements going into those burden ratios? A. Not for this particular time, no.

Q. Have you for any other time? A. Well, we have at the present time.

Q. Just the present time? A. Yes.

Q. The expenses which you have heretofore testified as being treated as a part of burden, when you derived these burden ratios set forth on Exhibits E, D and F, were those expense figures set forth in dollars or in percentages? A. They were set forth in dollars against the department; in the productive labor for the whole department, divided into the overhead to arrive at a percentage, and the percentage was applied on the unit labor cost of all parts produced in that department.

Q. And that was direct labor costs? A. Yes.

Q. And you do not have records now of those dollar overhead expenses? A. No, we do not.

(38) Q. Did you compile those overhead figures that were used in your allocation of burden by your department? A. I helped.

Q. And what was the compilation made on, made on cards? A. No.

Q. How was it compiled? A. Well, for instance, a summary of all the manufacturing expenses for material would be made from the requisitions and charged against each group, tabulating cards would be punched from there showing the expense account and the group, and the amount of money. That is just for general stores, material, the same procedure would go through on labor, the monthly labor

distribution, all the manufacturing expense accounts showing the dollars would be punched on tabulating cards.

Q. For that particular month? A. For that particular month, just for the month. The same thing would be true on the depreciation and journal entries, if there were any, and so forth, then of course they were automatically sorted by groups showing the total overhead distribution against each group or department.

Q. You say they were punched on cards? A. Tabulating cards.

Q. By a punch machine? A. By a punch machine.

Q. A Holdsworth machine, or some such machine? A. It is some such machine, yes.

Q. And these cards were sorted? A. Sorted by groups and then printed, and as they would be **(39)** printed they would show for each group, would show the expense account and the amount of money.

Q. Allocated to that? A. Allocated to that group, yes, and in addition to that, that is direct charges, in addition to that there would be the general expenses such as the office and so forth, which would be pro-rated over the different groups.

Q. When you say "groups" you mean "departments"? A. Departments, yes. The reason I say "groups," there is such a thing as to have more than one department with one overhead group. A department represents a clock card series and if two departments are similar it is possible rather than have two groups in going through the work and distributing expense twice we would have one group that represented two departments; that is the reason we call them "groups," although such wasn't the case for these costs here, a department represents a group.

Q. Do you still have those cards upon which was accumulated and punched this data? A. Tabulating cards?

Q. Yes. A. No, sir.

Q. Do you have any summary of those cards? A. No.

Q. For the years 1925 to 1931? A. No, sir, it takes an awful lot of cards; if I am not mistaken, we only hold the cards one month now, there are so many of them.

Q. And then what is done with them, do you know? **(40)** A. Just destroyed.

Q. One month after the month to which they apply? A. That is right.

Q. Do you know whether that practice obtained for 1925 to 1931? A. I wouldn't be certain as to that date.

Q. You didn't do the destroying yourself? A. No, sir.

Q. Or you didn't see them destroyed? A. No, sir.

* * * * *

(41) Q. (By Mr. Spohn): Now, Mr. Hovis, those burden cards that are punched, they are punched from some original data sheets, are they? A. Yes, sir.

Q. And did you compile the original— A. (Interposing): I would like to make a correction there. I said that all of the cards were tabulated; they were not, there was for the first period there the first number of years from, oh, 1923 on there we didn't have the tabulating machines in, and they were posted by hand, the same information exactly.

* * * * *

(43) And the general manufacturing expense, how was that compiled? A. That was charged to an individual group number, the same way, and we take the total of this group number and prorate it or distribute it over operating departments.

Q. Do you have those original sheets from which this data was compiled? A. No, sir.

Q. Do you know what became of those sheets? A. Destroyed.

Q. Do you know when they were destroyed? A. No, I don't.

Q. The general records of the company, however, for these years contain that basic information, do they not? A. Oh, yes, that is naturally they have it in a total, total manufacturing expenses for statements, but not allocated by groups for overhead purposes.

Q. And it is possible, is it not, to compile your burden figures now from those general figures on the ledgers of the company? A. You could not get it by groups, it just shows a total, for instance one account number would show total manufacturing expenses for that particular month for all departments in the **(44)** plant. It is a general ledger figure, it is not allocated by groups or departments at all.

Q. How was it allocated originally, in departments? A. It is allocated originally, as I stated, by taking the total

charges for the material or for labor, for instance, take labor as an example, it is punched from the time department records that are supplied the accounting department in hours for each account. The hours are extended by the hourly rate, by groups, and summarized by groups for the accounting department, overhead distribution only. Now, the summary of all these groups, the grand total of the expense is posted in the general ledger.

Q. But that grand total of course would be broken into items of expense? A. Not in the general ledger, no.

Q. But it would be in some subsidiary ledger? A. No, it is not posted in any ledger by groups at all, just in the total.

Q. But it is posted in the total? A. Just in the total.

Q. Was the overhead distributed to the departments on an area basis? A. For a certain number of accounts.

Q. What were those accounts? A. Repairs to buildings, depreciation on the buildings, sweeping and cleaning in the building; that is all.

Q. How about real estate taxes? A. Distributed that on valuation.

(45) Q. On a valuation basis? A. That is right.

Q. And how is your administrative overhead items allocated to departments? A. On a direct labor basis.

Q. What other items were allocated on a direct labor basis? A. All other items except the ones I just mentioned for valuation, which are taxes, and the ones that apply to the buildings which cannot be allocated to any department in the building, such as depreciation, repairs, and sweeping and cleaning, such as washing windows, and such things as that. All other manufacturing expenses are pro-rated on a labor basis, direct labor basis.

Q. Are your labor records complete for past years as to amounts of money paid for services in a department? A. Not by departments, that is overhead detail, you see, and we have no overhead detail at this time for that period by groups.

Q. When you come to take your inventory at the end of the year, how do you price your material with respect to merchandise on hand, finished cars, work in process, and so forth? A. At the present time we are pricing it at cost.

Q. How do you determine that cost? A. Just the way these cards are figured here, that is where the cost is taken from, from these cards.

Q. And does that same system obtain from 1925 to 1931, inclusive? A. Yes, sir.

Q. And your inventory was then priced on cost? **(46)** A. Yes, sir.

Q. Are those inventory records available for those years? A. I believe they are, I am not positive, I do not have anything to do with the inventory records, you see.

Q. You do not have any part in that? A. No.

* * * * *

(48) Cross Examination by Mr. Farley.

* * * * *

(49) Q. You referred during your cross examination to certain clock card series; just exactly what did you mean by that? A. Well, for convenience in making payrolls they designate clock card series which takes in a certain number of men, and they try to arrange these clock card series by departments, it is a little bit easier to turn in the time, turn in the average rate; for instance, a certain series has pay endings every two weeks, and if you take a certain period in relation to a department, why, it is easier to get an average rate that way than you would if you had one series representing more than one department, that way every department has an individual average rate.

Q. By the clock cards then you mean the time clock cards that are actually punched? **(50)** A. Punched in and out daily, yes.

Q. Just how does the company use those cards, if you know, in determining the direct labor costs for any one department for any particular month? A. The clock cards are pulled from the rack daily and the hours taken off of them and totaled up for the department.

Q. What department does that? A. The time department, and the distribution of time is made by the foreman, he allocates the time to an overhead expense account or direct to the symbol number. If it is charged direct to a symbol number. At the end of the day those hours are totaled up and distributed to the symbol num-

bers and the expense accounts and they are balanced with the hours shown on the clock cards.

Q. And that is turned over to the timekeeping department? A. That is turned over to the timekeeping department, and he posts that daily, he has a long sheet out there with the number of days in the month on and the accounts.

Q. That is the timekeeper in the department? A. The timekeeper in the department, he posts on there daily and balances the distribution to the account daily, with the hours on the clock cards. Then at the end of the month those are totaled up, this sheet that gives the total charge for the month in hours to each account. That is sent up to the accounting department and that in turn is balanced with the payroll hours which are taken of course again from the clock cards. We get a distribution of payroll hours and money from the payroll department. That is where we get the average rate from. And, those hours are again of **(51)** course balanced with a labor distribution.

Q. And those are the figures that are employed in your department for the preparation of these cost summary cards, is that correct? A. That is right.

Q. Now, you were asked concerning the destruction of the tabulating cards. Do you know why those cards are destroyed by the company? A. Their volume is so great, there are so many cards that it would be just impossible to keep them around, and we have no further use for them.

Q. Now, are these tabulating cards cards of the type that have a series of punch holes in and are put into a Burroughs adding machine and the totals— A. (Interposing): That is right, you see they have to punch one card for every item for every account charged, no matter how many times it appears, and it makes an enormous number of cards for even a small amount of money sometimes. The same account number can be used by different departments so many times, you see.

Q. Are those tabulating cards of any particular value as a record to the company after the cards have been put through the machine? A. No.

Q. To get the total cost? A. No, we have balanced the information on those cards with the payroll of course and the general book expenses, and after **(52)** that we have the information we need to compile a cost.

Q. Roughly, about how many cost summary cards are made up on the average each month in your department, I mean by that, do you or have you in your department at any time in any one month made out a cost summary card for each and every part that goes into the Ford cars? A. You mean have we made a new card in any one month?

Q. Take any one of these cost summary cards, take for example this Exhibit E-1, which covers the months of May and July of 1929, and it covers the camshafts. Now, of the two or three thousand parts that go into the Ford car, or that went into the Ford car in May or June of 1929, would your department have made out a cost summary card for each and every one of those parts, do you know? A. Oh, yes, we would have to have a card for each one and every part exactly the same as this one.

Q. Well, do you do that every month in your department? A. No, just when costs are figured.

Q. And then in any particular month where you are figuring costs you figure costs for the entire plant on everything, or do you take say one-half of the item say in May and June and then July and August take another half? A. No, we figure the entire cost when we compile it. One of the main objects of figuring the cost that way is to arrive at a new percentage figure, basis, to cost sales on parts.

Q. I see. Now, roughly, how many individual original records and sheets are required to be used in your department, **(53)** referring to these tabulating cards and any and all other records you might use, roughly, how many would you need and would you use to prepare all of the cost summary cards, would it be a matter of hundreds or thousands or tens of thousands, or what? A. I would say thousands, it is an enormous job, there are so many parts and so many different models, and each model of course as far as body types are concerned and commercial types has an entirely different set of parts and each one requires a separate cost.

Q. And then the information contained in all of these separate cards is tabulated, compiled and posted onto cost summary cards and they then, as a permanent record of the company, replace the separate original records? A. That is it, the detail, yes.

Q. Now, you were asked about the operation sheet and as to whether or not you were familiar with the operations in department 410, and that is the operation sheet that is attached to the Exhibit A and Exhibit 7; do your duties at any time take you out into the plant to observe any of those operations; are you in the habit of going out into the plant in the various departments? A. No, primarily the cost department in the office is only interested in the total production and direct labor charged against the parts for the month. That is all that is necessary to compile costs. This is written up as a target and more to help the foreman, show him about what these different operations of time that should be taken to produce **(54)** them.

Q. Do you know anything about the system that is used to compile those operation sheets? A. In general.

Q. Would you state generally what it is? A. Well, they send a man around with a stop watch and he takes a reasonable length of time to clock these different operations and makes allowance, he does not just take how many a man can do in half an hour, he has certain bases that are set up for what they call fatigue, a man getting a drink and just relaxing and just standing around, you might say; there is a certain percentage, that has to come off. In other words, the time study is taken that represents a fair figure that it should be produced in, not an impossible figure, just what it ordinarily should cost.

Q. You mean a fair figure extending over a rather extended period of time rather than five or ten minutes' operation? A. Yes, in fact another thing that they use this time study for that they have used it, for instance a department they think is over-manned, there are too many men in there and they have taken time studies and figured the production, the required production and based on this time study about how many men should be in that department, and they have reduced the force according to the study made from the time study and still got out the regular production. It shows that they were actually over-manned, see.

Q. Now, would you think, from your knowledge of the methods used by the Ford Company, that the operation sheets are reliable in order to obtain costs on a particular one or **(55)** part of the many operations covered by the cost summary card such as Exhibit "E"? A. Yes.

* * * * *

A. I would like to say in as much as these time studies are used by the foreman as a guide for the parts they produce and they concentrate their efforts to bring this actual minute cost down to the time study which they do, I would say that they represented very close to the actual time.

* * * * *

(56) Re-Cross Examination by Mr. Spohn.

Q. But these cost summary cards, some of which you have been able to produce, those are important, are they not, from the historical cost standpoint? A. No, I wouldn't say so.

Q. Compare costs year in and year out with prior years' costs in your plant? A. What is that again?

Q. Don't you compare one year's costs against the prior year's costs? A. We have a summary of automobiles, that is the only thing, we have a complete summary of the cost of a car, we have those all the way back, but not by individual parts. There is no occasion that I know of where anybody has requested a comparison of individual parts from one year to another.

Q. So you have none of that comparative cost data for those years? A. No, not on parts for those years.

Q. Now, when a time study is made in a given department do you know how that time study is made? A. Not any more than I just stated, by taking a stop watch and (57) going and watching the operations, after production has reached the point where it is somewhere near normal.

Q. And then how long do you know would that time study consume in that department? A. Oh, no, each operation might take a different length of time. It all depends on the number produced. Sometimes a certain operation they produce a lot more than they do others, and it requires different lengths of time on different operations, but just how long I couldn't state.

Q. Will it be perfected in one day, would you say generally? A. On a whole job?

Q. Yes. A. Oh, no, here is a job here that has some 40 so operations, another one might have 3, so there would be no scheduled length of time to take the time study of a part, it would be all based on operations.

Q. Now, when you pointed to this job you referred to Exhibit No. 7? A. That is right, attached to Exhibit "A," I believe.

Q. Yes. And that had 72 operations? A. Well, I made a mistake there.

Q. And each of those 72 operations would be timed, is that right? A. That is correct.

Q. Would they be timed once, each of the 72? A. Well, if conditions looked right on that particular day, not necessarily once, if it looked like they are speeding up the operation, because the time study man is there, he may **(58)** become a little suspicious and take it and drop back the next day, or maybe a week from then. He may take several to satisfy himself it is correct. The object is to get a fair time study, and of course he uses his own judgment to arrive at that.

Q. Per part? A. Per part.

Q. Per part, yes. Assuming that the company were to discontinue the use of certain machinery or equipment upon which an operation was performed, and installed new equipment, would time studies then be made in your opinion on the new equipment? A. Oh, yes.

Q. And what would be done with the time studies theretofore made on the old equipment which was now replaced by the new equipment? A. I think it would be just brought up to date, just like this last one is here, it would be revised as of a certain date, that is one of the reasons that they have revisions; if there was no changes in the equipment or the method of manufacture there wouldn't be any necessity for writing a new operation sheet.

Q. Then on Exhibit 7, for example, attached to Exhibit "A," which is revised to July 1, 1931, that might extend backwards over different items of equipment in the same department? A. Yes, sir.

Q. And revisions made whenever a new item of equipment comes in? A. That is one of the reasons; there may be other reasons.

(59) Q. When a revision is made the prior cards are destroyed? A. Prior time study?

Q. Yes. A. Yes, sir. The reason for that is so that they can not get them mixed up and use the old one instead

of the revised one. When they issue a new one they check the old one and destroy it.

Q. Do you know whether your department, or did you yourself compile any actual cost of shaping and turning camshafts for any period within the years 1925 to 1931? A. No, sir, just the turning operation that you are talking about now?

Q. Yes, that is it. A. No, I never did.

Q. Do you know whether there were any such cost records compiled? A. Not to my knowledge.

Q. Would you have knowledge of that if those records were compiled? A. Yes, I think I would in the cost department.

Q. Would any other departments compile such cost records other than your department? A. All costs are supposed to be compiled in the cost department, where the figures are available, of course, such as labor rates and burden rates, and so forth.

Q. So that you are sure that there were no such cost records compiled? A. That is right.

Q. For any of the years 1925 to 1931, inclusive? **(60)** A. That is correct.

* * * * *

RE-CROSS EXAMINATION by Mr. Farley.

Q. Just a minute, Mr. Hovis. You said in answer to Mr. Spohn's question that there may be other reasons as to why new operation sheets would be prepared. Would you please state what those other reasons might be? A. The location, the re-arranging of the department might be changed, they may change the location of the machinery without getting any new equipment, but somebody might devise a new lay-out of the department where there would be less trucking from one machine to another, less handling, and so forth. Such things as that are going on all the time, where they can speed up the production by handling it less, which reduces the time study and does not necessarily involve bringing in new equipment.

Q. How about changes in the construction of a part due to model changes? A. Oh, yes, sure.

Q. That is changes from "T" to model "A"? A. Changing the design, yes.

Q. That is of course one of the other reasons? A. Yes.

Q. Now, in view of Mr. Spohn's questions concerning the practice of the company in keeping records on the shaping or **(61)** turning of cams of the camshaft, would you please tell the Court what you told me when I came to you and asked you to give me such costs, if you remember, when I first got in contact with you out there on this particular proposition? A. Well, I don't know what I told you, but there is only one explanation that I can give. We do not compile operation costs because we haven't any use for them. Our object is to get complete costs of all operations on the parts only, and that is necessary to arrive at the total manufacturing cost of the parts so that it can be assembled into the built-up automobile. We never have any requests for operation cost, and if we did go to the extent and the expense to charge overhead, and so forth, by machines, which literally would make thousands and thousands of overhead group distributions, why we wouldn't have any use for it after we got it. We do not get any more costs than is absolutely necessary for our needs, which is to get the cost of a built-up car to set selling prices and to cost our parts sales.

Q. Do you know of any practical way in which the company, you as a member of the accounting department, know of any practical way in which the company could keep records of the output per hour, for example, of each and every individual machine in the Ford plant? A. They would have to assign a number so that labor could be charged to that machine and production could be kept for that machine, the expense and overhead repairs and depreciation and upkeep of that particular machine would have to be **(62)** allocated. It means where we have one group number now for all the machines in a department we would have to have a separate labor charge and overhead group for every operation and machine.

Q. Do you know roughly about how many thousands of machines there are in the Ford plant? A. I haven't any idea, I couldn't say, it is a big plant and it is full of them.

Q. Now, with respect to the questions on the compilation of individual operation costs, is it the practice of the

company to keep or compile any such costs at the present date? A. No, sir.

Mr. Farley: That is all.

RE-CROSS EXAMINATION by Mr. Spohn.

Q. And the reason it does not compile such costs is because it has no use for them? A. That is it exactly.

Q. That is the only reason? A. That is right.

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(67) HAROLD M. WOEHRLE was thereupon called as a witness, and having been first duly sworn, testified as follows:

CROSS EXAMINATION by Mr. Spohn.

Mr. Farley: If your Honor please, and if Mr. Spohn hasn't any objection, I would like to ask Mr. Woehrle the general question concerning his connection with this matter, how he got in, and what he was instructed to do.

The Master: I think that would be a good way to begin.

The Witness: As I recall, it was about October 29, we got the second request, or Mr. Farley got the second request; it was about November 1st I was called in on the case.

Mr. Spohn: What year, 1937?

The Witness: 1937.

Mr. Farley: For the purpose of the record by the second **(68)** request you mean the second order we received from the Master to furnish a further statement of account?

A. Yes, it is dated October 29th, I think. Then, about November 1, 1937, I went directly to the Ford Administration Building and interviewed Mr. Hovis to find out just how far he had gone in his work. I obtained from him the department head names, the names of the department heads, and the shop foremen, and anyone that might give me a lead where I could find the records. I spent from November 1 to December 25 getting this information, and compiling the various figures used in the amendment to the

first answer, which is Exhibit B, and the allowance used in the Exhibit C. During that time, almost two months, I went probably to every department head and shop foreman that would in any way become connected or have anything to do with the camshaft for that department. I spent almost a week in the Highland Park files going through drawer after drawer, and box after box of old records, which even the filing clerk didn't know were there. I also went through drawer after drawer in the basement files in the Administration Building in Dearborn searching for records. I found additional cost summary cards, operations sheets, productive labor reports, minute cost summaries, which were used in the preparation of Exhibits B and C. I guess that is all I have in summary.

Q. (By Mr. Spohn) Mr. Woehrle, you reside here in Detroit? A. I just moved to Detroit from Ferndale this week.

Q. This week? A. Yes.

Q. Where is Ferndale? A. Ferndale is—well, in fact, it was three blocks north of the (69) boundary line of Detroit.

Q. You are associated in business with what firm? A. Lybrand, Ross Brothers & Montgomery, Certified Public Accountants.

Q. And they have their office in what city? A. We have about 30 offices. The office here is 2912 Book Building.

Q. Is that in charge of an office manager? A. That is a resident partner.

Q. Who is the resident partner? A. Donald Russell.

Q. And you are associated with that firm of accountants? A. I am.

Q. And are you a certified public accountant? A. I am.

Q. Certified under the laws of what state? A. State of Michigan.

Q. How long have you been so certified? A. Since December 31st, 1934.

Q. In your firm, how many accountants are there, in the Detroit firm? A. That varies between seasons, of course.

Q. At or about November or December, 1937, about how many would you say were employed by your firm? A. 35, approximately.

Q. You have senior and junior accountants employed by your firm? A. Well, we designate them as such, but there is a gradual transition from a junior to a senior, of course.

Q. During this work that you did for the defendant, Ford Motor Company, in November and December, 1937, did you have any **(70)** assistance from your office? A. Very little.

Q. Did you have any? A. Our records would tell the actual number of hours. We do keep our records on an hourly basis up to date by the hour, so that we could tell how many hours of assistance I had.

Q. Did you have any assistance out at the plant at all, or was there any assistance— A. (Interrupting) I had one man assisting me by the name of Shawkey, who directed me to the various places where I desired to go.

Q. He was an employee of the Ford Motor Company? A. He still is.

Q. Did you have any of your other associates from your office out working with you in the month of November and December, 1937, while you were working on this? A. A few days or perhaps a week. I don't know exactly. It is in our record over there, if you care to know exactly how many hours.

Q. Anyway, the search you made through these drawers you spoke of, was done by you, was it? A. Almost entirely. I did have help during one week over there at Highland Park, a man by the name of Willey, who assisted me in dusting off the records and digging in for them. I gave him a list of just what I was looking for, or what to look for.

Q. Did you spend any of your time in the general records of the Ford Motor Company? A. By "general records" what do you mean?

Q. General accounting records, ledgers, and general records of **(71)** account? A. You mean the general ledger?

Q. Yes. A. No, there are no files in the general ledger, which would—

Q. (Interposing) Did you go into it? A. I have worked on the general ledgers time and again, but this time there was no need for it.

Q. Do you do any auditing work for the Ford Motor Company? A. The Ford Motor has no audit.

Q. Do you do any accounting work for the Ford Motor Company other than the work you performed in November and December, 1937? A. I do.

Q. What is the nature of that work? A. Principally income tax and other taxes.

Q. But, it doesn't include audit work? A. No, they have their own internal auditing staff.

Q. Their own internal auditing staff? A. Yes.

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(80) Q. The last paragraph beginning on page 9, starting out: "Cost of power consumption"; did you prepare any of that? A. I computed 55 hours of actual operation per wheel, based upon studies made by Mr. Price of the tool supply room.

Q. Did Mr. Price tell you that 55 hours should be used? A. Yes.

Q. You made no independent study of your own? A. No.

Q. When Mr. Price made that statement to you, did he have any written study of it, or just an oral statement? A. I might elaborate and state that Mr. Price gave me records from which I compiled the 55, and then he OK'd what I had **(81)** compiled. In other words, he checked it back.

Q. What records did you use in compiling that 55 hours of actual operation? A. As I remember it, they were from about 8½ by 11 type sheets, bound in a folder that he had maintained year after year for his own individual information; not a company record.

Q. But they would relate to what? A. They related to grinding wheels.

Q. Do you have those records? A. I do not.

Q. They were made available to you, though? A. They were. I can produce them, if necessary.

Q. And the individual's, who compiled those records, name was Mr. Price? A. Mr. Price.

Q. All right.

* * * * *

(98) Q. And now what is Exhibit "G"? A. Exhibit "G" is called a cost summary. It is a 5 by 8 card.

Q. And it is on form similar to Exhibit G; that cost is summarized by departments, is it? A. Will you please repeat that question?

Q. I say, it is on cards similar to Exhibit G, that costs are summarized by departments, for a department? A. No, I think you will find that the productive labor reports are the summaries by departments, and periodically these cost summaries are prepared in order to cost the finished car, in order to cost the parts for the finished car.

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(105) Re-Cross Examination by Mr. Spohn.

Q. Just refer to page 26 again, the paragraph beginning on the top of page 26, "The Ford cam-shaft shapers were overhauled by the maintenance men on the average of one machine per month, or approximately every machine once a year. The Melling cam lathes were cleaned and freed of chips on the average of one machine each day, or about twice a month for each machine." Is that your text? A. That is.

Q. And where did you secure the information upon which you base that statement? A. From maintenance men working in the maintenance department of the Ford Motor Company.

Q. Did you have any records of the company that indicated such overhauling on which you base that statement? A. There are no records to my knowledge of the maintenance, there are records setting forth the general overhaul costs.

Q. Who were the maintenance men with whom you talked? A. May I refer to my notes?

(106) Q. Sure. A. (Referring to notes.)

Q. These notes that you are now referring to, Mr. Woehrle, are they what we call work papers? A. Working papers, they are notations I jotted down as I was talking to the various men in the shop. Mr. Henry Pillinger made the statement that the Melling machines were torn down on the average of one each day, or every machine once in sixteen days. Mr. John Smith made the statement that the major job in keeping the Melling machines clean—the major job was in keeping the Melling machines clean

and free from chips and that two machines were down all the time.

Q. And by "down" you mean what? A. Not operating.

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(111) Q. Now, Mr. Woehrle, will you take Exhibit C and refer to Schedule 1, sheet 1, page 2, that Exhibit, you have that before you? A. I do.

Q. That Exhibit purports to set forth losses sustained upon certain operations in machining model "T 410" cam shaft on the cam shapers as against the Melling cam lathes? A. Yes.

Q. Is that the purport of that Exhibit? A. That is right.

Q. Now, you understand, do you, that under the order of this Court the accounting was to be—the accounting of the defendant was to be of profit, gain and advantages? A. That is right.

Q. Derived by the defendant from the use of the infringing machine, you understood that? A. I understood that.

Q. And when you prepared Exhibit C did you have that order in mind? A. Yes, sir.

Q. And the Schedule 1, sheet 1, that is an attempt to arrive in figures of the profits, gains and advantages derived by the defendant from the use of the machine, is that a fact? **(112)** A. I don't like the word "attempt."

Q. Well, it is your version of it? A. It is my version of it, yes.

Q. Now, Mr. Woehrle, in Schedule 1, sheet 1, you do not have any overhead figures, do you? A. No.

Q. You did not use overhead anywhere in your report, Exhibit C, did you? A. I did not.

Q. Why didn't you? A. There were no records available which I could use that would be—would throw any light on the profit or loss with the machines.

* * * * *

Q. Did you have the advantage of an analysis of Exhibit 11 attached to Exhibit A while you were preparing Schedule 1, sheet 1, in Exhibit C? **(113)** A. I was aware of it, yes.

Q. And you were aware then of the burden percentage figure appearing in the paragraph, the center of the first page of Exhibit 11? A. I was.

Q. And you did not use that percentage? A. I saw no connection between that percentage and any of the figures that I used or needed to use.

Q. So then your testimony is that you did not— A. (Interposing): You will note that is the burden rate for the entire department. I was interested in operations of specific machines, that is why I did not use any burden rate. There were no burden rates applicable to individual machines.

Q. Ordinarily cost of manufacture item contains what elements of cost? A. Just in general?

Q. In general. A. The cost of manufacture includes material, labor and overhead.

Q. And burden? A. Well, overhead is the same term for burden.

Q. Ordinarily a manufactured article would include those three elements, would it not? A. It will.

Q. Will you refer to Exhibit 6, attached to Exhibit A, being cost summary sheet for the month of May, 1929, and July of 1929. Will you refer to department 410. Burden is computed on that cost summary sheet, isn't it, for those two months? **(114)** A. It has been posted here.

Q. It has been posted here? A. That is right.

Q. And did you have the advantage of an examination of Exhibit 6 attached to Exhibit A when you were preparing Exhibit C? A. I did.

Q. And I show you now Exhibit E-1, and the reverse side thereof, cost summary for March, 1929, and referring to department 410, there is a burden figure there posted, is there not? A. There is.

Q. And did you have the advantage of an examination of that Exhibit E-1, and the reverse side, when you were making Exhibit C? A. I did.

Q. And I refer you now to Exhibits F-4, 5 and 6, and ask you if you had the advantage of an examination of those cost summary cards when preparing Exhibit C for months therein set forth? A. I did.

Q. And those cost summary cards have posted burden figures, do they not? A. They do.

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(115) Mr. Spohn: Referring to Exhibit F-6, and particularly on the left-hand side where there is typed "Inventory December 31, 1926," what is the significance of that language?

Mr. Hovis: That inventory or that cost is a special cost that was compiled to price the inventory.

Mr. Spohn: As of December 31—

The Master: If Mr. Hovis is going to answer several questions, I do not know that he has to take the stand, but bring him up closer to the reporter.

Mr. Spohn: What was your answer, Mr. Hovis?

Mr. Hovis: That cost was compiled as a special cost to price the inventory.

Mr. Spohn: On December 31, 1926?

Mr. Hovis: That is right.

Mr. Spohn: And was that pricing done for general record purposes of the Ford Motor Company?

Mr. Hovis: Yes.

Mr. Spohn: And that figure was then carried into the inventory records?

(116) Mr. Hovis: Yes.

Mr. Spohn: And tax returns made out on the basis of that inventory?

Mr. Hovis: I wouldn't be familiar with that.

Mr. Spohn: But that special pricing computation does include a burden as posted for department 410, does it not?

Mr. Hovis: Yes, sir.

Mr. Spohn: For December 31, 1926.

Mr. Hovis: That is right.

Mr. Spohn: And would that be for the material or cam shafts then on hand?

Mr. Hovis: Yes.

Mr. Spohn: Manufactured in department 410?

Mr. Hovis: Yes.

Mr. Spohn: Do you know whether that same policy was pursued for each of the other years, December 31, 1927?

Mr. Hovis: No, I don't know.

Mr. Spohn: You don't know, each of the other years following December 31, 1926, you don't know?

Mr. Hovis: No.

Mr. Spohn: That is all, Mr. Hovis.

Q. (By Mr. Spohn): Now, Mr. Woehrle, in connection with the preparation of Schedule 1, sheet 1, Exhibit C, if a certain amount of overhead is attributed to a department isn't it customary then to distribute that overhead among the various operations of that department on some basis for distribution to be worked out generally? A. I don't think so.

(117) Q. That hasn't been your experience? A. No, sir.

Q. These cards, Exhibit F-1 to Exhibit F-6, indicate that was the defendant's experience, do they not? A. No, sir.

Q. They do not? A. The department as a whole, that is the department as a whole.

Q. As a whole, yes. A. As a whole.

Q. Why couldn't that overhead assigned to the department as a whole be assigned to operating activities in the department? A. What would be the purpose of assigning?

Q. Well, could it be done on some basis of proportionment or assignment, assuming there was a purpose? A. I don't know how you could do it unless you knew how much space these machines occupied.

Q. But knowing that? A. Well, you would have to know what space these machines occupied for every day and every month and every year.

Q. And knowing that? A. And knowing that you would have a square footage or a cubic volume, perhaps, basis, but that is just an approximation.

Q. All apportionments of overhead or allocations are approximations, are they not? A. Oh, not exactly, some are metered.

Q. There is no scientific method of distributing burden, is there? **(118)** A. There are methods in practice that are accepted by accountants.

Q. Now on Schedule 1, sheet 1, of Exhibit C, in setting up the losses there computed, did you give any effect to tool expense? A. You will note in Footnote "A" it says, "No cost records are available to show by separate operations the comparative power costs, tool costs, scrap losses or other incidental items."

Q. Well, will you turn to Exhibit A and Exhibit 8 attached to it. Item "H" is cutting tool costs per cam shaft? A. Yes.

Q. And the first statement submitted by the defendant then in Exhibit A there was such a cutting tool cost, was there not, worked out? A. Apparently so.

Q. Did you have the advantage of that information when you prepared Exhibit C? A. I did.

Q. And how much is that cutting tool cost as worked out there in item "H" of Exhibit 8 attached to Exhibit "A"? A. This statement says .0003.

Q. Per cam shaft? A. Per cam shaft.

Q. Now will you turn to Exhibit 9, attached to Exhibit A, and turn to item "G" of Exhibit 9. A. Yes.

Q. There is there set forth the cutting tool cost per shaft, is there not? **(119)** A. It appears so.

Q. And that figure is .0027? A. It is.

Q. Which is a much higher tool cost than that set forth in Exhibit 8, is it not? A. Yes.

Q. And Exhibit 9 purports to refer to items of cost in shaper operations in model "T" cam shafts? A. Yes, sir.

Q. And Exhibit 8 purports to cover computation of certain items on Walcott machine operation? A. Yes, sir.

Q. Now will you turn to Exhibit 10 attached to Exhibit "A." Now, Exhibit 10 purports to be material pricing cards for certain periods in there indicating the cost of cutting tools, does it not? A. It does.

Q. And do you know whether those are original records of the company, photostats of original records? A. I believe they are.

Q. You paid no attention to Exhibit 10, did you, in the computation of your Schedule 1, sheet 1? A. It did not cover the period I was interested in, my computation—

Q. (Interposing): Just say whether you did or not, you paid no attention to it? A. Do I have to say that?

Q. That is the question, you paid no attention to it?

(120) Mr. Farley: If your Honor please, I think the witness should be allowed to explain. Read the question.

(The question was read by the reporter.)

The Court: I think he can answer the question "yes" or "no" first and either the cross examiner ask for an explanation, or he can give it on re-direct. Answer the question "yes" or "no."

A. No, because it did not cover the period from June 15, 1925, to January 15, 1929, the period covered by my computation.

Q. With such a material difference in cutting tool expense, if you had been able to secure the information you would have given effect to that, wouldn't you? A. I would have.

Q. And if the information can now be secured, in your judgment effect should be given to it, should it not, in the computation of Schedule 1, sheet 1? A. I agree.

Q. The only question is the information is lacking? A. That is right.

* * * * *

(124) Q. Will you turn to Exhibit—before I go into Exhibit 13, Mr. Woehrle, assuming that you were directed or employed to derive the cost of an operation requiring machine work, a particular piece of material, considerable labor, would you set up any cost of that operation if it did not include burden? A. I think I would.

Q. And then you want to be understood as testifying that when the report in Exhibit C here is set forth the profits, gains and advantages derived by the defendant from the use of the infringing machine, that if there is any saving in overhead or burden that is not to be attributed as a profit, gain or advantage? A. If the burden is determinable I agree that you should make some allowance for the burden.

Q. Now, then, you want to be understood as testifying that if the burden figures can be determined— A. (Interposing): That is right.

Q. (Continuing): —upon the operation of turning these cam shafts— A. (Interposing): That is right.

Q. (Continuing): —effect should be given to that burden figure? **(125)** A. Absolutely.

Q. In any comparison as between the operation on the shaper or on the Melling cam lathes? A. That is right.

Q. But the fact is that you have not reflected the burden figures anywhere in Exhibit C? A. No, sir; I will

further add that I have only used figures where I could point or pick out of a record or absolute statement of an employee. I made no assumptions that were not based upon facts and figures obtained from those two sources.

Q. But your report, Exhibit C, does include several conclusions based upon that information? A. That is right.

* * * * *

(150) Cross Examination by Mr. Spohn.

Q. (By Mr. Spohn): Now then, Mr. Woehrle, referring to Schedule 1, sheet 1 again, and your explanation, the description of means and methods appearing on page 19, if you **(151)** had computed and used burden in this matter, even under the time consumption that you have used on the bottom of page 19, it would have operated to the benefit of the plaintiff, would it not, in your accounting? A. Will you please repeat the question?

(The question was read by the reporter.)

A. No, principally because I do not see how you could figure any burden time.

Q. Assuming that burden can be computed for the periods of time involved in the accounting of Schedule 1, sheet 1, from June 16, 1925, to January 15, 1929? A. Well, if burden could be computed, I believe it would be the same for each type of machine, because the machines themselves are practically the same type of machine, they are not—one does not occupy a whole building, and the other just a corner of the building; there are all machines—I took a look at some samples or exhibits over in the Highland Park plant, and they all just looked like machines to me, and if those machines would occupy different amounts of space, I can't see how they would,—it appears to me that the space needed for those type of machines would be about the same, whether you use the millers or shapers, since overhead or burden could be figured on the space occupied, I do not see how it would make much difference whether you use the burden or not.

Q. Would you give no effect to the fact that less time was consumed on the Melling cam lathe than on the Ford shapers, in the distribution of burden to an operation? **(152)** A. Just what do you mean, more or less time?

Q. Read the question, Mr. Reporter.

(The question was read by the reporter.)

A. I do not think time would make much difference, if you are taking taxes and depreciation and these overhead amounts, time does not make much difference in one operation.

Q. But on reference to Exhibit 6, attached to Exhibit "A," burden is there apportioned, is it not, to department 410 on a labor basis? A. On a labor basis?

Q. Yes. A. On a direct labor basis.

Q. On a direct labor basis? A. Yes.

Q. And you wouldn't use that basis? A. Suppose you did use a direct labor basis, I cannot see that it would make any difference.

Mr. Spohn: I ask that the answer be stricken as not responsive. Will you read the question?

The Master: It is stricken. Read back the question.

(The question was read by the reporter.)

The Master: The question is whether you would use that basis and not what difference it would make if you did use it.

A. I see. I wouldn't use direct labor entirely, principally because space has a lot to do with allocating expenses.

Q. (By Mr. Spohn): But you would use direct labor to some extent? **(153)** A. Yes, for certain operations.

Q. And you did not use burden in the computation of the loss that you set up on Schedule 1, page 1, of Exhibit "C"? A. I didn't use any burden figures.

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(155) Q. Now, will you refer to page 19 of Exhibit "C," and the computation near the bottom of the page, there is assigned to straightening one-half minute on the Melling cam lathe, and then turn to page 20, paragraph 3, I will read you this paragraph, that is page 20, Exhibit "C": "The straightening operation was required before the shafts were placed in the Melling cam lathe, but not before being placed in the Ford cam shapers, because of the difference in the construction, and the difference in

operations of the two machines.'' Did you write that paragraph? A. I wrote it in collaboration with the counsel for the defendant.

Q. From whom did you get your information contained in that paragraph that the straightening operation was required before the shaft was put in the Melling cam lathe but not before being placed in the Ford cam shapers? A. Mr. Dalton Lee.

Q. What information did he give you? A. He stated the cam shaper required no straightening operations because shaper shaved metal off lengthwise.

Mr. Farley: Lengthwise?

A. Lengthwise. A straightening operation was required on the Melling cam lathe in order that cam-shafts revolve true. In other words, revolving motion. The straightening operation came before the turn cam lathe operation. The straightening operation continued until machines were no longer used. Joe H. Galbraith, without any prompting Mr. Galbraith stated that the straightening operation just before the turned cam lathe operation was installed at the time the **(156)** Melling cam lathes were installed, also that this operation was continued until the machines were scrapped.

* * * * *

(157) Q. (By Mr. Spohn): Now, then, Mr. Woehrle, were there any other individuals you interviewed with respect to the straightening operation? **(158)** A. Mr. Gus Schwartz, the straightening operation was required on new cam lathe because they could not get away without straightening. In other words, the scrap was greater when straightening operation was not used. A greater chance was taken on possibility of scrap when straightening operation was omitted. This chance was greater on the Melling cam lathe than on the old shaper. The old shaper held the cam shaft more firmly than the new Melling lathe, and consequently rather truer. The old shaper worked lengthwise, while the lathe works in a revolving position.

Q. Were there any other individuals with whom you discussed that question? A. Jay Gould, no straightening operation was required just before the cam shaping operation. Shapers would hold the shaft even. Those shafts

were not straight. New cam lathes required a straightening operation just before shafts were placed in lathes. Reason, crooked shafts would bend and break machine. Always had straightening operation subsequent to installation of lathes.

Q. And of course you have no independent knowledge on the fact of straightening other than as you discovered from your conferences with these four individuals? A. Just a moment, I may find a few more. Albert Aptekar, he was in the cam-shaft department from 1916 to 1931. Reason for straightening operation just before cam lathe operation; the shaft had to be straighter or truer because of the construction of the steady-rest, the old steady-rest for the shaper was short and on the solid base of the machine, there **(159)** were also three supports which steadied the cam-shaft while it was being tooled. The steady-rest for the cam lathe was longer and supported on one side of the machine. There was only one rest. This steady-rest would produce or permit greater vibration when the tools were cutting. Therefore, it was necessary to have the shaft straight in order to get a clean job. The old shaper would take the cam-shaft without being straightened because the construction of the machine would cut the cams in line with the bearing, even though the shaft was not absolutely straight (providing there was sufficient stock). Mr. Aptekar examined a Melling lathe located at Ford Highland Park, and also blue-prints of the old cam shaper, and re-stated the facts as set forth hereinbefore.

Q. Were those all the individuals with whom you talked as to the question of the straightening operation? A. I believe that is all.

Mr. Farley: Might I have a question there? How about Mr. Shawkey, didn't you discuss that with Shawkey, do you recall?

A. I don't recall now whether he gave me any light on that or not. If he did, we can always get it again.

Q. (By Mr. Spohn): In the use of that straightening operation in the accounting for minutes required on page 19, is based upon the information that you secured from the agents or employees of the Ford Motor Company? A. Except that from Exhibit 13 to Exhibit 14, there is no

mention of any straightening operation made in Exhibit 13, (160) whereas there is in Exhibit 14.

Q. As supplemented, that information then as supplemented by Exhibit 14? A. This testimony I obtain from the employees supplemented the information obtained from operation sheets Exhibit 13 and Exhibit 14.

* * * * *

(162) Q. (By Mr. Spohn): Now, Mr. Woehrle, will you refer again to schedule 1, sheet 1, of Exhibit "C," and the extraordinary repairs set forth there in the sum of $23,579.66, with a footnote, "C." That footnote is to the effect that expenditures were made in 1928, '29 and '30, on 14 Melling cam lathes. The necessity for overhauling resulted principally from the use of the machines on model "T" 410 production. Did you write that footnote, "C"? A. In collaboration with our partner, Mr. Russell, yes.

Q. And where did you receive the information to the effect that the necessity for overhauling resulted principally from the use of the machines on model "T" 410 production? A. From job orders.

Q. And from job orders only? A. Or work orders, as they are called, I guess.

(163) Q. Shop orders or work orders? A. Yes.

Q. Job orders? A. Yes.

Q. And you had no further conferences on this matter with anyone other than Mr. Russell? A. I am not positive just who I talked to, but I am quite sure I took the matter up with someone out at Ford's before I made the statement.

Q. You don't know of any note to that, do you? A. I don't think so, no.

Q. And you cannot recall now with whom you discussed it, if anyone? A. No, no, I cannot.

Q. Well, when you put that note on there you had Exhibit "A," or had at least read Exhibit "A," had you not? A. Yes.

Q. And is it possible that you secured the information for the writing of that note from Exhibit "A," page 5 paragraph 15 of Exhibit "A"? A. Those apparently are the same amounts that we have used in schedule 1, sheet 6 of Exhibit "C," only we have elaborated on those amounts giving the details setting forth just the overhauls made on these machines.

Q. Mr. Woehrle, before we get too far into this overhauling, in order to keep as close to your testimony on the straightening operation, will you take Exhibit "B" again and refer to item 23 on page 5, item 23 on page 5 of Exhibit "B"? Did you **(164)** write that paragraph? A. I wrote that, yes.

Q. And the information that you secured to write that paragraph 23 in Exhibit "B" was obtained from whom? A. Exhibit 14 in Exhibit "C."

Q. Was that the only source of information? A. Yes.

Q. Now, you still have Exhibit "B" there. Will you turn to item 34, Exhibit "B"? Did you write that paragraph, Mr. Woehrle? A. Maybe not word for word, but I think I wrote most of it.

Q. And the sources of your information with respect to that paragraph were what? A. Just a moment, please. Apparently it was taken from Exhibit 13.

Q. And the rest of it? A. The rest of what?

Q. The rest of the information, you say part of it was obtained from Exhibit 13.

Mr. Farley: He said "apparently taken."

Q. I beg your pardon, apparently taken, I beg your pardon. A. Apparently taken.

Q. Well, would your testimony be to the best of your knowledge it was taken from Exhibit 13? A. It was, yes.

* * * * *

(166) Q. (By Mr. Spohn, continuing) Now, with reference to this overhauling or extraordinary repairs set forth on Schedule 1, $22,579.66, that total is taken, is it not, from Schedule 1, sheet 6? A. It is.

Q. Do you have the original shop orders, or work orders? A. I do.

Q. May I see those, please?

(Documents produced by the witness and presented to Mr. Spohn.)

Mr. Spohn: I will ask the reporter to give an exhibit number for the purposes of identification to the work orders which you have just handed to me, totalling 14 in number.

(14 documents were thereupon marked Exhibits "P-1," to "P-14," respectively, by the reporter.)

Mr. Spohn: The shop orders on overhaulings have been marked "P-1" to "P-14."

Q. Mr. Woehrle, do you have any knowledge of the numbering of accounts used by the defendant company in its ordinary accounting records? A. Not absolutely, no.

Q. Would you know what account number 590 appearing on Exhibit "P-1" might be (handing document to witness)? A. No, I don't.

Mr. Spohn: Mr. Hovis, could you state what account No. 590, appearing on Exhibit P-1, might refer to.

Mr. Hovis: Yes, profit and loss.

Mr. Spohn: Profit and loss, is that 590?

Mr. Hovis: That is right.

(167) Q. (By Mr. Spohn) Mr. Woehrle, on Exhibit P-6, there appear two account numbers, 270 and 770. Would you know what those account numbers refer to? A. No, I don't.

Mr. Spohn: Would you know, Mr. Hovis?

Mr. Hovis: 270 represents construction in process, the control account for all work orders.

Mr. Spohn: And 770?

Mr. Hovis: And 770 represents salvage expense.

Q. (By Mr. Spohn) Mr. Woehrle, did you state you had photostats of these Exhibits, P-1 to P-14? A. Just the first sheets I think you will find.

Q. Just the first sheets? A. Yes, just the first sheets.

Mr. Spohn: Mr. Farley, may we take these and make our own copies of them? We think they may be material here. Or would you rather have photostats made?

Mr. Farley: I think I would rather have photostats made and supply them to you, because these are original records.

Mr. Spohn: We would appreciate that.

Q. (By Mr. Spohn) Mr. Woehrle, will you refer now to Schedule 1, sheet 6, and over to the right half of that schedule, "Explanation per work orders." Did you write that explanation? A. I don't remember if I wrote it personally or not, but I checked it over.

Q. Did the information come to you for that explanation from these various work orders, Exhibits P-1 to P-14? A. Yes, sir.

Q. Now, Schedule 1, Sheet 1, in your accounting you charge all of **(168)** this overhauling to expense, do you not? A. Yes.

Q. And charge it against the Melling cam lathes? A. That is right.

Q. In doing that, did you refer to Exhibit 8 of Exhibit "A," where part of this expense was charged to the "A" shaft production, Exhibit 8, page 3? In Exhibit "A," part of that overhauling cost is charged to the manufacture of the "A" shaft, is it not? A. Apparently, yes.

Q. And in your report it is all charged to the "T" shaft production? A. That is right.

Q. And, will you refer to Exhibit 8 again, attached to Exhibit "A," and that overhauling expense there is charged out on a depreciation basis, is it not? A. I don't know. I didn't prepare it.

Q. Can't you tell from looking at it? A. It doesn't say anything about depreciation there; just 12½ percent. That could mean that they figured the overhaul would be one every eight years. It wouldn't have to be depreciation.

Q. So, you don't know whether that was done on a depreciation basis or not, of your own information? A. No, I didn't prepare it.

Q. You charged it out just as expense? A. That is right.

Q. And all to the "T" shaft production? A. That is right.

Q. Now, from your review of these shop orders, or work orders, Exhibits P-1 to P-14, inclusive, did you notice that on some of **(169)** them the overhaul was to prepare for operation 13, turn cams on A-6250 camshaft? A. Yes, sir.

Q. Did you make any investigations as to what that language meant on the work shop order? A. No, I think it is self-explanatory.

Q. You made no examination? A. Those persons writing those evidently—at least, I didn't find the original writer of these work orders.

Q. So, you had no discussion with whoever did it? A. Had no discussion.

Q. Is it true that those work orders, total cost on the several work orders, includes moving from plant to plant? Take the first one, 31,472, work order R-26501; "Move from K-7 motor building to B-58 foundry." A. That is moving it from the motor building to the place where they made the overhaul repairs on it. In other words, they had to move it over there to make the repairs.

Q. Is B-58 the foundry? Is that where they made repairs, do you know? A. That is what it says.

Q. You have no information as to the nature of the work performed on these Melling cam lathes when overhauled, other than is disclosed from the work orders themselves, do you? A. I can't remember now whether I talked to anybody else about it or not. But, to me—

Q. (Interposing) Would the fact these 14 Melling lathes were overhauled in late 1928 and in 1929, and one in 1930, at about the time new lathes of the same type were being bought, might **(170)** that indicate there were additions or betterments being put on these machines? A. No.

Q. It wouldn't necessarily, in your opinion? A. No.

Q. Do you have any knowledge as to whether there were any additions or betterments put on these 14 Melling lathes overhauled on the date set forth in Schedule 1, Sheet 6, to make them conform to the purchases of Melling cam lathes by the defendant within the months of January, March and April of 1929, as set forth in Item 2 of Exhibit B? A. I do not.

Q. You do not have any information? A. No.

Q. Now, will you refer again to Sheet 1 of Schedule 1, extraordinary repairs, footnote B, which is in the following language: "The records for the Ford cam shapers for the period in which these machines were used indicate only three instances of extraordinary repairs and overhauling. The amounts expended are not available." Did you write that paragraph? A. I did.

Q. What, therefore, did you have reference to when you say the records indicate only three instances of extraordinary repairs that the expenses are not available? A. The permanent inventory of the tools, and machinery.

Q. Do you have the records of those three instances with you? A. They are in those records which you obtained last night, and I think you have returned them now. I have the records.

Q. And those records you now present, being permanent inventory of **(171)** machine tools, and the first of those instances is on a permanent inventory machine tool card, No. 10,706, which I am asking the reporter to identify.

(The document above referred to was thereupon marked Exhibit "Q.")

Mr. Spohn: And, I will ask to have marked the permanent inventory of machine tool card, No. 11,628, identified as Exhibit "R."

(The document above referred to was thereupon marked Exhibit "R," by the reporter.)

Mr. Spohn: And, permanent inventory of machine tool card, No. 12,205, identified as Exhibit "S."

(The document above referred to was thereupon marked Exhibit "S" by the reporter.)

Q. Mr. Woehrle, will you now turn to page 21 of Exhibit C, and the last paragraph on that page, which reads as follows: "Ford cam shapers were overhauled by the maintenance men on the average of one machine per month, or approximately every machine once a year. The Melling cam lathes were cleaned and freed of chips on the average of one machine every day, or about twice a month for each machine." Did you write that paragraph? A. That is one machine each day.

Q. That is one machine each day. A. Yes, I did.

Q. What information did you have when you wrote that paragraph concerning the overhauling of the Ford cam shapers?

Mr. Farley: I don't want to be unnecessarily objecting, Mr. Spohn, but I believe we went all over that once. He testified where he got that information. But, if you want to repeat **(172)** it, I have no objection.

Mr. Spohn: I don't have any distinct remembrance of that, your Honor, please. I would like to cover it now, and it will be later stricken if it has been covered before.

The Master: Go ahead. It doesn't need to be stricken then unless it is too repetitious.

A. I obtained that directly from the testimony of a man in the shop. Perhaps, when I start reading their names you will recall the incidents. I think counsel for the plaintiff is correct. I don't think we have covered this.

Mr. John Smith. Mr. John Smith made the statement that two men were used on each of the two shifts to maintain the cam shapers, while four men were required to maintain the cam lathes on two shifts. He further stated Mr. Buckmann was the regular maintenance man on the old shapers, and he had one helper. I also refer to Mr. Buckmann's testimony.

Mr. Farley: Might I suggest that you change "that testimony" to "statement."

A. Yes, statement of Mr. Buckmann. Mr. Buckmann was the regular maintenance man on the cam shapers. He had a helper he called Frenchy, and there were two maintenance men on the day shifts, and one on the night shifts. When the shapers were replaced by lathes, it took four maintenance men on each day shift, and one maintenance man on the night shift. Mr. Buckmann was on the maintenance crew only a short time after the installation of the Melling cam lathes. Mr. Henry Pillinger.

Mr. Pillinger states there were four men in the maintenance crew to keep the Melling lathes in operation; Mr. Pillinger and three others on one shift, and four others on another shift. For **(173)** the midnight shift only one man was required.

Mr. Pillinger gave the names of the following men who were on the maintenance crews. Robert McGregor, a man whose last name is Alvers, Alex Kennedy, Frank Chapman, Frank McKinnie, Mr. James Ferris.

Mr. Ferris stated four men worked on each shift on the Melling lathes. He said one shift was made up of himself, Emmry, Allan, and Craig. Allan was later replaced by Hocking.

Another shift included Alvers, Kennedy, and Chapman.

Still another shift included McGregor, Harding and Livingston.

He further made the statement that these men were shifted about from time to time so that at different times

different men were on different shifts. I believe that is all.

Q. Did you have any other information concerning overhauling, aside from the information you have just read to us? A. This is normal overhauling. Now, we have, understand, extraordinary overhauling which is covered by those work orders.

Q. Is this what you call a normal overhauling? A. This is normal overhauling.

Q. The testimony you have given with respect to page 21, the last paragraph on that page, does that, likewise apply to the paragraph beginning on page 26 of Exhibit C? It is in the exact language, or very nearly exact? A. It is the very same language, isn't it?

Q. The same testimony would apply to that paragraph, too? A. Yes.

Q. You wrote that paragraph beginning at the top of page 26, line 4? **(174)** A. I did.

Q. Now, with respect to your account being for profits, gains and advantages set forth on Schedule 1, Sheet 1, did you read the testimony taken in this matter on the trial of this case before Judge Tuttle? A. No, I didn't.

Q. None of it? A. No.

Q. Will you turn to Schedule 2 of Exhibit C, sheet 1, page 8. You have found that schedule? A. Yes, page 8.

Q. Is that accounting there set forth on that schedule with reference to comparative costs of certain operations in machine Model A, 6250 camshafts based on the use of Ford cam shapers to machine those "A" shafts? A. It is.

Q. Now, on Exhibit C, in connection with the Schedule 2, will you turn to page 18, paragraph 2-B. That paragraph 2-B reads as follows: "In preparing Schedule 2, defendant had computed the cost of machining the cams of the Model A, 6250 camshafts on Ford cam shapers of the type regularly used by defendant in its plant for machining model T-410 camshafts." Did you write that paragraph? A. I did, in collaboration with counsel for the defendant.

Q. And from whom did you obtain the information that the model "A" could have been machined on the Ford cam shapers? A. Mr. Pioch.

Q. Where does he live, do you know? A. I don't know where he lives.

(175) Q. Is he an employee of the Ford Motor Company? A. He is.

Q. Do you have any notes as to your conversation with him? A. Yes.

Q. Just a moment. I will withdraw that question.

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(184) RE-DIRECT EXAMINATION by Mr. Farley.

Q. Mr. Woehrle, in view of the very extended examination of Mr. Spohn on the matter of overhead, would you please state, referring to page 19, of Exhibit C, and the fact as I recall (185) your testimony, you stated it might be correct to figure overhead on the basis of direct labor, if you had figured overhead on that basis, would it have affected the net results of your computation as contained on sheet 2 of Exhibit C, and if so, how would it have affected it? A. Well, if we used direct labor, and referring to page 19 of Exhibit C, we have 3½ minutes of time consumed under the Ford cam shaper method, and we have 3.66 minutes consumed under the Melling cam lathe. Naturally, if we applied an overhead based on labor it would be to the advantage of the defendant to use such a computation.

Q. Now, when you prepared these computations, also in view of the many questions asked you concerning your experience in cost accounting, did you check over your entire method of computation that you used with anyone having experience in cost accounting? A. I did, sir.

Q. And, with whom? A. Our resident partner, Mr. Donald M. Russell.

Q. Does Mr. Russell have any particular experience in cost accounting, as far as you know? A. He is one of our experienced cost accounting men in our firm. He is at present the president of the local chapter of the National Association of Cost Accountants here in Detroit.

Q. Now, I have here your own office copy of your Exhibit C, and I call your attention to the stamp appearing on the first page, signed by— A. "D. M. R." and approved by "D. M. R." Those are Mr. Russell's (186) own initials, signed by Mr. Russell.

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Q. Now, you were asked some questions to the general effect as to whether or not you had included any cost for tools in your computations in view of the cost for tools that was set up in Exhibit B, which was not prepared by you. I would like you to explain just why it was you did not include any tool cost in your computations.

Mr. Spohn: Exhibit "A."

Mr. Farley: Exhibit "A," pardon me.

(187) A. I considered that tool cost there computed in Exhibit A based in part on estimates; whereas, my computations are based upon information obtained from records or employees in the Ford Motor Company.

Q. With respect to the cards which were attached to Exhibit A, showing costs of blades, did you make any check in so far as those cards were concerned to determine whether or not they correctly reflected the number of tools that had been bought over any period of time? A. I checked with the Purchasing Department to try to determine or obtain records of purchases of tools during the infringing period. I was informed that no such records were available other than the record there exhibited, and furthermore—

Q. (Interposing): That is Exhibit 10? A. And, furthermore, that those cards there represent, perhaps, only a portion of the purchases, and they do not purport to represent all of the purchases of those types of tools.

Q. And it was your opinion, was it, that the tabulation as prepared and filed in Exhibit A with respect to tool cost was too speculative for you to take those figures into consideration? A. That is right.

Q. I am going to ask you if, in addition to the operation sheets and other records you considered, did you consider any other ones which you have not heretofore mentioned in your testimony; that is, I mean by that, any standard set of investigations concerning the production of machines? **(188)** A. There is a report which was prepared by an engineer by the name of Payne who made a study of the Melling cam lathes for a ten-weeks' period in 1924, which shows that the operations of the Melling cam lathes produced an average of, I think it is 71 shafts per man, operating two machines.

Q. And how do those figures compare with the ones you used in your computations? A. In my computations

I have used from the basis of Exhibit 14, 70 shafts per hour per man, which would give 35 per hour per machine. Therefore, they compare very closely.

Q. Do you have those reports of Mr. Payne in your possession? A. The originals are located in the file in the Administration Building at Ford Motor Company.

Q. I am going to produce photostatic copies and show them to you, and ask you if you know what they are (handing documents to witness)? A. These appear to be photostatic copies of the ten-weeks' report prepared by Mr. Payne, and was a summary of these reports showing the computation of the number of hours the machines operated, the number of pieces produced, and the pieces per hour.

Q. I am going to ask that that group of photostats be marked for identification, "W-1" to "W-14."

(The documents above-referred to were thereupon marked "Exhibits W-1 to W-14," respectively, by the reporter.)

Mr. Farley: We will produce the originals for your benefit, Mr. Spohn.

(189) Mr. Spohn: All right.

Q. (By Mr. Farley): Have you given any particular consideration to these reports which, for convenience, I will refer to as the Payne reports? Have you given any particular study to them with respect to the times were shut down for repairs? A. I merely made a cursory examination of them and know what they purport to include.

Q. Would you say whether or not, or do you feel you are sufficiently acquainted with it, to state whether or not the Payne reports tend to confirm or contradict the statements made to you by the various Ford employees you interviewed concerning the number of maintenance men that might be required? A. It confirms—

Mr. Spohn (Interposing): Just a minute, I object to that and ask to have the answer stricken as a conclusion. The reports speak for themselves.

Mr. Farley: The witness is here to give expert testimony, and it seems to me that he is entitled to draw conclusions.

The Master: I think virtually all of the witness' testimony is opinion testimony. Obviously, he hasn't testified directly as to the facts, except from his inspection of these records and his report here largely consists of conclusions from methods and other information which he secured. It seems to me that the question is proper, and I overrule the objection. Read the question back.

(190) (The last question was read by the reporter.)

The Master: First state whether you are sufficiently qualified to state; if you studied the Payne reports sufficiently so that you can make such a statement.

A. I have studied the Payne reports sufficiently, and I will add that that report confirms the number of maintenance men required to keep those machines in running operation.

Q. Just on that subject of maintenance men, I think you used the term "running over-hauls" that the maintenance men were accustomed to perform. Isn't the usual term for men who are in a department taking care of running repairs, isn't it usually called maintenance repairs rather than over-haul? A. Maintenance repairs; that is right.

Q. May I see your statement from your interview with Mr. Pioch? A. Offhand, I am not familiar where that is filed.

Mr. Farley: Well, we will drop that in view of the fact Mr. Spohn withdrew his question on that. It probably wouldn't be proper for me to bring it up. I think that is all, Mr. Spohn.

RE-CROSS EXAMINATION by Mr. Spohn.

Q. With respect to Exhibits W-1 to W-14, inclusive, the Payne report, that study purports to have been made over a ten-week period in 1924; that is correct, is it not? A. Yes, sir.

Q. That is outside the accounting period here involved. Who is Mr. Payne, do you know? **(191)** A. He was a man in the engineering department, no longer in the Ford employ.

Q. Do you know what his first name was? A. No, I don't.

Q. Can you advise us, Mr.— A. (Interposing): On page 4 his initials are H. E. Payne, Engineer.

Q. You say he is no longer with the Ford Motor Company? A. No.

Q. Do you know whether he is alive now, or not? A. I do not.

Q. When did you first see this Exhibit W? A. November, 1937.

Q. What part of November, 1937? A. I don't remember now just when it was called to my attention, but it was in November. I made most of my examination in November.

Q. Did you see this report prior to discovery or finding of Exhibit 14 attached to Exhibit C? A. I wouldn't know, sir. This information is gathered over a period of several weeks, and I just didn't make my computations until after I had assembled enough material to get somewhere with it.

Q. Well, your own time record shows you the order in which you examined Exhibits W-1 to W-14, and Exhibit 14 attached to Exhibit C? A. No, they would not.

Q. Now, the fact you were unable to discover record evidence with reference to small cutting tool expense on the cam **(192)** lathes, Ford cam shapers, and also with respect to the Melling machines, it doesn't mean that expense should be ignored, does it, if it can be found any other way? A. If it can be found any other way, it should be included.

Q. Obviously, where the differential is 9 to 1 in favor of the Melling machine against the cam shaper with respect to cutting tools, that item will be material, may it not? A. Where do you arrive at 9 to 1?

Q. Assuming it is 9 to 1 advantage. A. How do you arrive at that?

Q. Never mind how I arrive at that. Assume it is 9 to 1 advantage on cost. A. I don't get the point.

The Master: Will you re-phrase your whole question?

Q. Assuming the cost of cutting tools for cam shafts manufactured, or the cam shaper, is nine times as much as

the cutting tool expense on the Melling machines, then that item should be considered in any accounting for profits, gains, and advantages of the defendant, should it not? A. If the amounts can be determined. Likewise, if it is 1 to 9, the other way, we should include it also.

Mr. Spohn: That is all for the present.

RE-DIRECT EXAMINATION by Mr. Farley.

Q. Of course the length or life of the tool naturally would have a great bearing on the subject, too, would it not? A. Yes, sir.

Mr. Farley: That is all.

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(194) FRED M. HOVIS was thereupon recalled as a witness, having been previously duly sworn, testified further as follows:

CROSS EXAMINATION by Mr. Spohn.

* * * * *

(198) Mr. Spohn: The notice to produce, Paragraph Two: "Ratios of burden to labor by months throughout the accounting period of the department or departments in which F-446 camshafts were ground prior to February, 1924."

Mr. Farley's reply to that Paragraph Two: "The only records available which show the ratios of burden to labor for Department 105, in which the F-446 camshafts were made are shown by the cost summary cards for the F-446 camshaft which we sent to Mr. Michael with our letter of the 3rd."

Mr. Farley, those are the cost summary cards which have just been identified as Exhibits F-11, F-12 and F-13?

Mr. Farley: That is right.

* * * * *

(200) Paragraph Seven of the notice to produce: "Statements by months throughout the accounting period showing in dollars and cents the labor cost and burden for the department or departments in which

T-410, A-6250 and F-446 camshafts were made by the defendant on the infringing machines."

Reply of Mr. Farley. "Paragraph Seven: Mr. Woehrle now has in course of preparation statements by months throughout the accounting period of the labor cost and burden as requested in Paragraph numbered seven. I am advised that there will be some periods of time during which the labor cost and burden were not figured for the separate departments. As to these periods, the best we can do is to follow the regular practice of the Ford Company and calculate for those months where labor and burden costs were not figured, the labor **(201)** cost and burden in dollars and cents by employing the burden rate for the period when it was last available. We note that Mr. Watts is requesting the labor cost and burden for the department or departments in which the camshafts were made by the use of the Walcott machines. It would be practically impossible to compute these figures for certain months where the records we have discovered do not give the figures for the complete department. A large number of parts were made in the same department, and it would involve searching for and locating cost summary cards for all the parts made in the department to get the total cost and burden figures for the entire department. We find upon checking matters that where the burden rate for the entire department is shown by available records, that the available camshaft cost summary cards for the same months show that exactly the same burden rate as established by the figures for the entire department was employed in figuring camshaft costs."

* * * * *

(205) HAROLD M. WOEHRLE was thereupon recalled as a witness, having been previously duly sworn, testified further as follows:

CROSS EXAMINATION by Mr. Spohn.

* * * * *

(206) Mr. Spohn: Will you mark these, please.

(Whereupon, three documents were marked Exhibits "X-1," "X-2" and "X-3," respectively, by the Reporter.)

Q. Mr. Woehrle, these three typewritten sheets of paper which you have handed to me, which have been identified tentatively as Exhibits X-1, X-2 and X-3, they are the computation of burden made by you for the period involved in this accounting? A. They are; for the periods given.

Q. As set forth in the exhibit? A. As set forth in the exhibit; that is right.

Q. And, it is your understanding, Mr. Woehrle, that the A-6250 shaft was machined in Department 410? A. Yes, sir.

Q. Now, referring to Exhibit X-3, Department 105, your understanding is that that is the department in which the tractor camshaft was machined? A. Yes, sir.

Q. And Department 102, the camshaft was also machined in that department? A. Yes, sir.

Q. What is Department 106? A. I don't know. Perhaps Mr. Hovis can tell us?

Mr. Hovis: I don't remember exactly, either, but it is more or less of a machining department, also; additional machining operations.

Q. Is this a fact, that the tractor camshafts were sometimes **(207)** machined in Department 106?

Mr. Hovis: There may be certain operations, maybe heat treats; something like that. But, the machining operations that would involve the question here would be in 102 and 105.

Q. Do you know, Mr. Woehrle, what the significance is of the statement, Departments 102, 105 and 106 combined? A. It appears from the records which I found that the persons who made up these burden amounts and labor amounts

combined all three departments. Whether for convenience or what, I don't know.

Q. Into one summary? A. Into one summary figure.

Q. And it was from that summary you worked in preparing this Exhibit X-3? A. That is right.

Q. And the same burden rate, then, was computed for all three of them on a combined basis; is that right? A. That is right.

Q. Now, Mr. Woehrle, will you state for the purposes of the record here how you arrived at this computation set forth on Exhibits X-1, X-2 and X-3? A. I made no computations; they are merely amounts copied from records which I obtained in the Ford Motor Company files.

Q. And were those records the cost summary cards that have been identified? A. They were not.

(208) Q. They were not. What were those records that you used? I mean, just describe the records you used. A. They were bound sheets of paper, bound in fiber covers and marked on the outside cover "Burden Rates" and "Burden Computations." I have them here in the Court Room.

Q. May I see them.

(Above-described documents were thereupon produced by the witness.)

Mr. Spohn: Will you mark these, please.

(Whereupon, three sets of bound documents were marked Exhibits "X-4," "X-5" and "X-6," respectively, by the Reporter.)

Q. Now, this bound record which you handed me, and which has on the outside of it, "Tractor Overhead," and has been identified as Exhibit X-4, and the two bound books which you have handed me, which have been marked for identification as Exhibits X-5 and X-6, the latter two being motor assembly overhead; that is correct, isn't it? A. Yes, sir.

Q. Now, with respect to Exhibits X-4, X-5 and X-6, your testimony is that it was from those exhibits that you compiled the overhead data which is set forth in Exhibits X-1, X-2 and X-3? A. It is.

Q. Did you just copy that data on Exhibits X-1, X-2 and X-3 from X-4, X-5 and X-6? A. Yes, sir.

Q. Did you make any investigation as to whether the overhead figures set forth in Exhibits X-4, X-5 and X-6 was the same **(209)** as that on the cost summary cards in evidence, F-1 to F-13? A. Yes, sir.

Q. Do you know it did? You made such an examination? A. I did.

Q. Did it check with that overhead? A. In the majority of cases it did.

Q. In the majority of cases. Do you know of your own knowledge whether Exhibits X-4, X-5 and X-6 are the exhibits from which the overhead percentages set forth on the cost summary cards are taken? A. I was told those were the records that they used in preparing the cost summary cards.

Q. In preparing the cost summary cards? A. That is right.

Q. In other words, Exhibits X-4, X-5 and X-6 are the records from which, as far as you know, the burden percentage set forth on the cost summary cards, Exhibit F-1 to F-13 were taken? A. In cases where they agreed; yes.

Q. In cases where they agreed? A. That is right.

Q. Did you make any investigation as to those cases in which they didn't agree? A. I was told by members of the department in cases where the burden rates as figured appeared too high for some reason or other, adjustments were sometimes made to bring the burden rate into line with the approximate average that had been in practice in prior periods.

(210) Q. And that recomputed figure was the figure that was extended in the cost summary cards, Exhibits F-1 to F-13, as the case may be? A. Yes, sir.

Q. Mr. Woehrle, referring now to Exhibit X-3, you will note that there is a percentage in two instances enclosed within a parenthesis; the first is for the month of March of 1926 having in parenthesis "used 150 pct.," and for the month of March, 1928, in parenthesis there "used 176 pct."; do you know what the meaning of those terms in the parentheses are? A. I believe they mean that while the first amounts in column three are the amounts, the overhead percentages which are computed from the productive labor and overhead amounts, it is apparent from this

parenthetical phrase that the amount in this last column, or the margin, were the amounts they actually used in figuring cost.

Q. Am I to understand in this last column on Exhibit X-3 all the percentages of overhead are as there stated, except in two instances a lower percentage was used, and that lower percentage is in the parenthesis? A. I wouldn't want to say absolutely without re-checking it.

Q. Is that your understanding of it? A. It is my understanding, but I wouldn't be too sure of that.

* * * * *

(245) Mr. Spohn: Mr. Farley, do you have the originals of your machine inventory cards for the Walcott machines?

The Witness: You mean the permanent inventory records?

Mr. Spohn: Yes.

The Witness: No, I returned those to the file. I had them here the last time and returned them to the file.

Mr. Spohn: Have you photostats of them?

Mr. Farley: Have you photostats of them?

The Witness: Yes, sir (producing documents).

Mr. Spohn: Will you mark these, please, Mr. Reporter?

(24 documents were thereupon marked Exhibits Y-1 to Y-24, respectively.)

Mr. Spohn: A permanent inventory of machine tool cards have been marked for identification Y-1 to Y-24, inclusive.

* * * * *

(257) Cross Examination by Mr. Farley.

Q. Mr. Woehrle, I was glancing over the transcript the other day, but I don't have the spot right here; it seems to me you were asked by Mr. Spohn in the last hearing to prepare a tabulation on the overhead during the various periods we have examined into, the various periods of time, such figures as you had available—I mean by that, the percentage overhead. Did you make any such computation? A. I have prepared computations of burden, and I have had them **(258)** typed up and they are available here.

Q. I wish you would produce those, please. A. (Documents were produced by the witness.)

Mr. Farley: I don't know whether you had forgotten this or not, Mr. Spohn.

Mr. Spohn: My memory of the transcript is that the demand was made on Mr. Hovis.

Mr. Farley: Maybe it was. I know it was made on someone.

Mr. Spohn: I know your letter refers to Mr. Hovis concerning that data.

The Witness: I think you are right; I think Mr. Hovis was requested.

Q. These are Mr. Hovis' records, then, is that right? A. Indirectly.

Mr. Farley: I don't know whether you want to have this marked as an exhibit for identification or not.

Mr. Spohn: It is your exhibit, if you want to have it marked for identification without offering it at the present time we have no objection.

Mr. Farley: All right, we will mark it. Is it your scheme, Mr. Quaife, that we use numbers, say, for the defendant, and letters for the plaintiff, or what? I don't know where we stand on that right now, to tell the truth.

(A short discussion was had off the record.)

(The document above referred to was thereupon marked Defendant's Exhibit 200.)

Q. In general, Mr. Woehrle, this covers the period from what **(259)** dates to what dates, will you please state? A. The periods covered are for the Model T camshaft, beginning June 16, 1925, and ending January 15, 1929, and the period covered by the Model A is from November, 1927, to February 3, 1931.

Q. For the purpose of clarity of the record, suppose you just mark the sheets 1, 2 and 3, and then refer to which sheet you are talking about?

The Witness: I think it would be better to number the computation on the Model T-410 as page 1.

(The document above referred to was thereupon marked as page 1 of Defendant's Exhibit 200.)

* * * * *

(261) Q. Assume you had used the available figures and the available system or usual system at the Ford Motor Company in computing overhead, and you had in your schedules, Exhibit "C," used overhead figures as they were available to you from the Ford Company records, how would they have affected the final figures you got showing a loss to the Ford Company? A. It is apparent from Exhibit No. 200—page 1 that the burden amount total computed on the Ford cam shapers totalled $203,655.96 for the three operations taken into consideration, whereas the same type of computation for the Melling cam lathes produced an overhead total of $212,965.96, or an additional loss **(262)** amounting to $9,310.00. And, continuing with the policy used by the Ford Motor Company, where burden percentages were not available, I was informed when cost or overhead percentages were not computed for a month if the overhead percentage was desired for that month the earliest or the prior month, or the earliest prior month available would be used in determining the cost.

* * * * *

(269) Mr. Spohn: If your Honor please, just one moment. If your Honor please, with respect to the former motion I made on Defendant's Exhibit 200 and withdrew with respect to your Honor's ruling, I would like to call your Honor's attention to the request made by us in the prior examination, on page 100 of the transcript; Mr. Hovis is on the stand.

Mr. Farley: What page?

Mr. Spohn: Page 100, near the bottom of the page:

"Q. Now, can you give us the other burden figure for years other than 1925 comparable to this 157 per cent? A. Yes, they could be arrived at by taking any of these cost cards, by taking the total burden and the total direct labor and making a division and arriving at the average per cent.

"Q. For each of the years 1925 to 1931? A. That is right.

"Q. Have you made any such computation? A. No, I have not.

"Q. The data is available to make such computation? A. Yes, sir.

"Q. Will you make such computation? A. Surely.

(270) "Q. (Beginning on page 101) And will counsel please present that computation?"

We there requested overhead from each of the years 1925 to 1931. As I understood it, Exhibits X-1, X-2 and X-3 make such computations. They are not any such computation as set forth in Exhibit 200, pages 1, 2 and 3. I move to strike the testimony.

Mr. Farley: I am afraid we have a difference of opinion there. Mr. Hovis was testifying about a percentage, 157. The Exhibits X-1, X-2 and X-3 don't give percentage figures, and the Exhibit 200, which we produced, does give the percentage figure. That is exactly what you asked for.

Mr. Spohn: Page 100, read it again. I will read it:

"Q. Now, can you give us the other burden figure for years other than 1925 comparable to this 157 per cent? A. Yes, they could be arrived at by taking any of these cost cards, by taking the total burden and the total direct labor and making a division and arriving at the average per cent."

That is exactly what you do on Exhibit X-1, take the productive labor and the overhead and divide them to get a per cent.

The Master: Mr. Farley, don't Exhibits X-1, X-2 and X-3 give everything that is requested, except the final per cent which is a simple mathematical computation?

Mr. Farley: I don't think they do, your Honor **(271)** please, because the request was for each of the months from 1925 to 1931. There are some of the months missing in X-1, X-2 and X-3, and the percentages are not given comparable to the 157 per cent. We produced exactly what record Mr. Spohn was asking for.

Mr. Spohn: We don't want to quibble, but we made a demand for figures and we have them, X-1, X-2 and X-3, and they are sufficient for the purposes of our demand. The percentages are calculable the same as any other percentages. Exhibit 200 does not meet our demands; it is part of the defendant's case.

The Master: I wonder if that isn't so. On further reflection it does seem to me that that is probably so. As I understand it, the purpose of the hearings that have been had so far in this case is to elicit information desired by the plaintiffs preliminary to bringing their case in full, and not to give the defendants an opportunity at this time to put in their case. I am wondering if this Exhibit 200 doesn't really go beyond the purpose of these hearings, and isn't actually an affirmative part of the defendant's case.

Mr. Farley: I can very readily appreciate, as far as Mr. Spohn is concerned, those figures are not any figures he wants to see at all.

Mr. Spohn: Now, on the contrary, Mr. Farley, I am not worried about the figures.

Mr. Farley: I don't care whether they go in now or not.

Mr. Spohn: I wanted it understood, your Honor, (272) these figures are not in request to any demand of ours.

The Master: If that is understood, then we may have them in the record now without the necessity of having a re-examination later.

Mr. Spohn: I have no objection, your Honor, to have the exhibit identified as Exhibit 200, but I do move that the testimony of the witness be stricken. I do not at this time wish to cross-examine this witness with respect to those figures. It is no part of our present proceedings.

The Master: I will strike the testimony except as it relates to the identification of the exhibit itself without prejudice to its being put in at a later time.

* * * * *

(275) Norman R. Scovill was thereupon called as a witness on behalf of the Defendant, and having been first duly sworn, testified as follows:

Direct Examination by Mr. Farley.

(276) Q. Will you please state your name, residence and occupation, Mr. Scovill? A. Norman R. Scovill; Systems and Method; 5003 Fernwood Avenue, Detroit.

Q. You said "Systems and Method." A. Yes.

Q. That is in answer to the question "Your occupation"? A. Yes, sir.

Q. Just what do you mean by that, Mr. Scovill? A. Well, we have—

Q. (Interposing): Let me ask you first by whom are you employed? A. Ford Motor.

Q. How long have you been employed by the Ford Motor Company? A. Going on 21 years.

Q. What is the nature of your duties at the Ford Motor Company? A. The passing on all stationery, printed stationery forms, watching the system, approving the purchase of the forms, and perhaps along the line of efficiency.

Q. In connection with your duties at the Ford Motor Company have you had anything to do with inventory systems there? A. I have dealt with the inventory since 1919.

* * * * *

Cross Examination by Mr. Spohn.

(294) Q. What else do you do with respect to the inventory? A. Why, of course—I might have to bring out the whole story if that is what you question.

Q. Do you have anything to do with pricing? A. Oh, yes. The entire summarization of the inventory comes under my supervision.

Q. When you say "summarization," do you mean the adding together of all the figures? A. It means the pricing, extending, verification.

Q. Where do you get the prices you use? A. We arrive at those prices from the Form 3566 cost card.

Q. Do you have anything to do with the preparation of 3511? A. No, sir.

Q. So that you take that card and then use that in the pricing of the inventory? A. Indirectly we use a list from that card.

Q. A list made up from that card? A. Yes, sir.

* * * * *

(44) Todd L. Moise was thereupon called as a witness on behalf of the Plaintiff herein, and having been first duly sworn, testified as follows:

Direct Examination by Mr. Spohn.

Q. Your name is Todd L. Moise? A. Yes.

Q. Where do you reside, Mr. Moise? A. In Elyria, Ohio.

Q. What is your occupation? A. Certified Public Accountant under the laws of Ohio.

Q. And what is your age? A. 61.

Q. Are you operating as an individual, or do you operate with some firm? A. I am the senior member of the firm of Moise & Burgess.

Q. Where does your firm have its office? A. The principal office in Elyria, and another office in Cleveland.

Q. That is, your firm is a partnership or corporation? A. Partnership.

Q. What is the character of business of your firm? A. Most of our work in cost and financial analysis, supervisory service throughout the year on cost matters, supervision and **(45)** installation of cost accounting besides the normal auditing work most certified public accountants do. Our work has largely to do with manufacturing companies.

Q. How long have you been in the accounting practice, Mr. Moise? A. Independent public accounting since 1922.

Q. And you stated you are a certified public accountant under the laws of the State of Ohio? A. Yes, sir.

Q. Are you a member of the American Institution of Accountants? A. Yes, and of the Ohio Society of Certified Public Accountants.

Q. Are you licensed to practice as a certified public accountant before the Treasury Department? A. Yes.

Q. Are you licensed to practice as a certified public accountant before the United States Board of Tax Appeals? A. Yes.

Q. You state you have manufacturing clients, do you? A. Quite a number.

Q. You do accounting work for them? A. Accounting work and cost work.

Q. And do you do accounting and cost work for any clients that manufacture automobile parts? A. Quite a number.

Q. You say you install cost records? A. Yes.

Q. And have what you call continuous cost service? A. Yes, sir.

Q. Explain to the Court what you mean by continuous cost service for your clients. **(46)** A. Well, the auditing of records, which is the primary work of a firm of certified public accountants, consists of preparing statements of the condition as of a certain date, and of operation over a certain period from the books adjusted by verifications or checks. But, the continuous service in cost and financial work means that you devise improvements to cost systems already in vogue, help train the personnel of the cost departments, generally attend directors' and executive meetings, and keep in touch with the affairs of the company and advise them on the things that come within the accountant's province. That is the principal part of the work and special part of the work of our firm which I handle myself.

Q. And, you state you specialize in cost work? A. Yes, sir.

Q. Have you examined defendant's statement of account? A. Yes.

Q. And have you examined the defendant's amended statement of account? A. I have.

Q. Have you examined the defendant's further statement of account? A. I have.

Q. Have you read the testimony of Messrs. Wibel, Martin and Herklotz as set forth in the printed record of this matter on appeal? A. I have, in full.

Q. Were you present before the Master in this matter during the days of March 17 and 18, and the days of June 1 and 2 when plaintiff's counsel was cross examining certain of defendant's **(47)** witnesses? A. I was, excepting for a portion—for the afternoon of June 2, and I have read the testimony advanced, the transcript of the testimony at that session.

Q. Now, have you examined all of the documents, papers, marked for identification as Plaintiff's Exhibits D to Y, inclusive, and Defendant's documents, papers and reports marked for identification as Defendant's Exhibits 200, 201 and 202 in this matter? A. I have.

Q. Have you made a computation of the profits, gains, savings and advantages, if any, received by the defend-

ant company for the period between June 16, 1925, and February 3, 1931? A. Yes, and I have them with me. The one marked in the corner is the original and the rest of them are carbon copies (producing documents above-referred to).

Q. Has this computation been reduced to report form? A. They have.

Q. And this report which you have now handed me is your report of such computation? A. It is.

* * * * *

(57) Q. On columns 2 and 3 of page 5 there is entitled, "Burden cost per shaft," and under the title column 3, a sub-title "Melling cam lathes," and column 2 a sub-title "Ford cam shapers," and "Landis grinders." From what sources did you derive the data upon which you computed these burden figures set forth in the second and third columns, page 5, of your report? A. That burden data is that furnished by the defendant by way of cost summary cards, and the letter of defendant's counsel read into the record on June 1, 1938, and Exhibits X-1, X-2 and X-3. I used this data prepared by the defendant, and my burden computations are set forth on pages 7, 8 and 9 of this report. On that I have used the figures presented in the letter referred to in these exhibits, excepting where it was not available, which applies to 1925, and for that I have used the cost summary cards presented by defendant covering those months.

Q. Your burden computation is an annual computation, is it not? A. It is.

Q. Why didn't you make a monthly computation? A. Because the data is not available for all months, and, generally speaking, burden is an overhead, is a matter of a fixed accounting period for a year. Because I have been compelled to use the fragmentary data which did not cover all months, and which eliminate almost all of the low production months, I have every reason to believe that the ratios used are extremely conservative because they are always increased on an annual basis because of more or less idle months, but **(58)** they were not available in most instances, so we used the ones that were, and used that for the entire year. It would be impossible to do it monthly when you haven't complete monthly data.

Q. Referring again to page 5 of your report, columns 4 and 5 are entitled "Total burden cost," and column 5 under the title is the sub-title "Melling cam lathes," and column 4 is the sub-title, "Ford cam shapers," and "Landis grinders." How did you compute the total burden cost used in these columns? A. By multiplying the production shown in the first column by the cost per shaft shown in the second and third columns.

Q. And the last column on page 5, again, of your report? A. That was obtained by deducting the items in the fifth column from those in the fourth.

Q. And on page 5 of your report you show the grand total savings and burden, $452,206.73? A. Yes, sir.

Q. What relationship, if any, has this total burden saving to the use of the Melling cam lathes set forth in page 5 of your report in the sum of $452,206.73, and the total productive labor savings for use of the Melling cam lathes appearing on page 4 of your report in the sum of $342,963.22 with the total saving of $795,169.95 computed by you and appearing on page 3 of your report? A. Well, the total of the item of $452,206.73 on page 5, and the item of $342,963.22 on page 4; these two total to the item of $795,169.95 shown upon page 3, not only in total, **(59)** but each of the individual items and sub-totals on pages 4 and 5 add to the corresponding item on page 3.

* * * * *

(62) Cross Examination by Mr. Farley.

Q. What was your occupation, Mr. Moise, prior to 1922? A. I was with the Steel Corporation.

Q. In what capacity? A. I was Treasurer of one of their companies and accounting officer of one of their larger divisions.

Q. When did you procure your C. P. A. degree? A. I took the examination in 1930. I think I got my degree in January, 1931.

Q. In the State of Ohio? A. In the State of Ohio.

Q. You stated on direct examination that you had been in supervision and installation of cost accounting for a number of automobile manufacturers, is that correct? A. Yes, automotive parts manufacturers.

Q. Just who were some of those manufacturers? A. I can not give the name of any clients.

Mr. Spohn: Objected to, just a moment. I object to that question as incompetent, irrelevant and immaterial. The witness is called as an expert witness, and he should be protected in the designation of his own clients.

Q. Have you ever installed any accounts for the manufacturer of automobiles as distinguished from automotive parts manufacturers? A. Not of automobile manufacturers.

* * * * *

(65) Q. You did not take into account in your computations any additional productive labor that might have been incurred because of necessity to straighten the shafts? A. This relates to the one operation solely because it is based on speeds, and it is the only operation that is shown to have been affected.

Q. Will you please answer the question "yes" or "no"; I asked if you took into account the additional operation because of straightening? **(66)** A. I didn't take it into account in this particular calculation. It is based on one alone.

Q. You did not take into account in your computation appearing on page 6, either, did you, the cost of maintenance of the machines; running maintenance? A. Yes, that is included. It is included, not on page 6, which is productive labor—yes, it is included in page 6 because it is in the burden.

Q. It is in the burden? A. Yes, sure.

Q. The burden in so far as that—where did you obtain that figure for burden? A. Pardon me?

Q. Where did you obtain that figure for burden? A. I obtained the burden from the data presented by counsel, I think on June 1, for such periods as that covered, but for 1925 I was compelled to rely on defendant's cost summary cards, because no burden figures were presented by defendant as such for that year. That is all set forth on pages 7, 8 and 9.

Q. Do you know how many operations are covered by the cost summary cards from which you took this burden figure? A. I don't get you? Oh—I don't know just how

many in each case. I do know in a given period it would probably correspond with that other sheet which is made from time studies.

Q. Do you know how many different parts were made in that particular department? A. I do not.

(67) Q. If the burden figure as given for that department covered a large number of operations, and if it were found upon examination that that burden figure is accepted, perhaps, for the whole plant, would it not change the burden figures materially if, as a matter of fact, in the experience of the Ford Company they had to use twice as many maintenance men to keep the Melling machines in operation as the Ford shapers? A. That isn't a burden rate for the whole plant. It is supposed to be the burden rate for that department according to the defendant's figures. There is no possible means yet presented in any evidence which will permit the breaking down of the elements of overhead in the Ford method of accounting; at least, in so far as any evidence so far presented. This method of using the overhead based on direct labor is the generally accepted one when there is no more scientific or other method of dividing or allocating it by items, and it is the method used by the Ford Motor Company in determining its inventory values, and, consequently, its profits as shown by cost summary cards which carry an inventory. It is the defendant's own method.

* * * * *

(76) Q. On this question of burden, appearing on your page 5, just how did you arrive at the figure, let us say, at the top of the second column, Ford cam shapers, $.015028? A. Pages 7, 8 and 9. That is the burden ratio. First, you have to turn to page 6 because, of course, you understand page 5 is merely an extension in totals of the unit cost shown on page 6. The corresponding item to the $.015028, the one on which it is based—if you will turn to page 6 you will find that that is .7514, which, multiplied by the .02 man hours required, comes to the .016286. The derivation of the .016286 is, therefore, very clear in itself. It is the burden cost per hour multiplied by the fraction of an hour required to shape a shaft with a Ford cam shaper at a speed of 25 per machine hour; 50 per man hour.

Q. Yes, but where did you get the figure? I understand that the **(77)** figure, .016286 on your sheet 6 is obtained by multiplying the figure in column 2, .8143 by .02; is that right? A. No; obtained by multiplying the burden cost per hour, 75.14 percent by .02.

Q. By .02. That gives you the figure—you blurted it out there. A. I am sorry.

Q. The .016286 figure? A. Yes.

Q. In the fifth column on page 6, that is obtained by multiplying the .8143 by .02, is that correct? A. No—yes, that is obtained by multiplying the .8143 by .02.

Q. And the burden figure of .015028 is obtained by multiplying the figure $.7514 by .02? A. That is right.

Q. I would like to know where you got the figure of .7514. A. That is obtained by multiplying the .8143 by .9227, which is the burden ratio to productive labor for that period.

Q. Where did you get the figure .9227? A. Now we come to where I thought we were to start.

Q. Yes. A. If you will turn to the first sheet, page 7, the first sheet of burden ratio to productive labor, you will find in the first group of figures in the right-hand column 92.27 per cent, which, of course, is .9227. That is the one figure which has to be obtained from cost summary cards at one period because in the data, Exhibits 1, 2 and 3, there was nothing for the year 1925, but there were cost summary cards **(78)** for 6 of the months in there, and those were used, all except December, and that showed that—from the cost summary cards, showed during those 5½ months on the production of 921,325 shafts each of the month's production that made up that total being multiplied by the labor cost and the burden cost taken from the cost summary cards, and so arrive at a total labor and a total burden for each period. Those added and divided the burden by the labor gives .9227.

Q. Have you convenient reference there to the cost summary cards you employed? A. They can be located on the record by the corresponding months. They are all on this exhibit, I think it is "E"; Exhibit "E." There is a tabulation of cost summary cards for each month, and there will be the corresponding months. That runs away back to 1923. For instance, take July, 1925—June is a half

month—and you will find on that, the second column on page 7, you will find .2960 for labor. The second item in the second column on sheet 7 is .2960.

Q. What month? A. July is the first complete month. July, 1925, you will find in the second column, page 7, the labor cost taken directly from the cost summary card of .2960, and opposite a burden cost taken from the same location of .3271. Those are the items shown in the second and third columns and the second line under "Unit Costs" on page 7.

Q. Did you carry out the burden on the figures given there in your total on page 7? **(79)** A. Yes.

Q. In the last column? A. Yes. In the testimony given here at the last hearing it was stated that those used on the cost summary cards were identical with the ones that made up the burden ratio, but they did not present the burden ratio and I was compelled to use the cost summary cards for those 6½ months. All the rest of it is based on the actual figure handled in Exhibits 1, 2 and 3.

Mr. Spohn: That is, Exhibits X-1, X-2 and X-3?

A. Yes, X-1, X-2 and X-3.

Q. (By Mr. Farley): Now, you have this weight of average burden percentage used for 1925 the figure of .9227. A. Yes.

Q. What I am trying to get at, did you use this .9227 to obtain the figure in the last or the right-hand column there on page 7? A. Yes.

Q. What? A. That is the result of those figures; by multiplying the production each month by the labor cost each month, and adding them up, I get a total labor cost for the 5½ months shown. By multiplying the production by the burden cost per unit I get the total burden for each of the periods, and adding them up I get the total burden for 5½ months. Dividing the total burden by the total labor naturally gives me a ratio of burden to labor, and that is what I have used.

Q. I don't know whether you understand me. What I am trying to get **(80)** at is, take for example, the month of October—or, let us say November of 1925 where you have a unit cost of labor .3084 and burden cost of .2570. A. Yes.

Q. Did you obtain the amount of 54,728.15 by multiplying 212,950 by .2570 or by taking?— A. (Interrupt-

ing): I obtained the item 65,673.78 by multiplying 212,950 by .3084, and I obtained the figure 54,728.15 in the last column by multiplying 212,950 by .2570.

Q. Now, your figures on burden, then, obtained from the cost summary card is based upon the assumption in so far as your sheet 5 is concerned, that both of these type machines required the same amount of maintenance; the maintenance of those machines bore the same proportionate part to the total burden as used in the cost summary cards? A. No individual elements of overhead are considered at all in there. It is based on the assumption that the overhead or burden of the department is reasonably in proportion to labor over a long period. There is no data presented which will permit of a complete breakdown of the overhead elements in any department there, nor is there any data which will give the cost per individual operation.

Q. If you ascertained from investigation that twice the amount of maintenance and men were required to keep the Melling machines running as against the shapers, would you not modify these burden figures accordingly? A. Not unless I could get a complete breakdown of all the overhead. **(81)** If I could, I would consider each one. Some may be in favor of each one and some may be against it.

* * * * *

Q. Now, for the period from January, 1926, to November, 1926, on your sheet 7, as I understand your computations there, you took the productive labor from Exhibits X-1, X-2 and X-3? A. Yes.

Q. Might I ask if they were cost summary cards? A. No. That is the data presented with counsel's letter, I believe, on June 1, this last meeting; that is the first time we had that. It is in the record.

Q. And I take it, without taking time to check through all of that right now, that those records, X-1, X-2 and X-3, just gave overhead for department 410 and productive labor for the entire department. That is true, isn't it? A. Yes.

Q. For those months, January, February, March, June and November? A. Presumably the entire department, and those are the only months included. The low production months were not included; normally low production months.

Q. And then you took the average, you averaged those figures and used the burden percentage of 132.19 for the entire year? A. For 1928.

Q. For 1926? A. Yes, for 1926.

(82) Q. And, you did the same for 1927? A. Yes, again they had 5 months there. In 1928 they did better. They gave 9 months there. 1929 gave all 12. 1930, they gave 12. 1931 had 2 months. That is so far as department 410 was concerned. Page 3 shows the same thing for department 105, or 102, 105, and 106 combined, which performed, according to the testimony, more or less the same functions.

Q. In each of these years where you saw fit to take the burden percentage as contained in the record, you used that for the particular month where you selected it, and then for the months where you did not select that particular figure you used an average; is that correct? A. No. For the entire year I used the average figure, because that is all the data we had. In some cases it was the complete year. Each year—

Q. (Interposing): Let us get to the year 1926. A. All right.

Q. To obtain the figure of 404,013.04, you obtained that figure, as I understand it, by multiplying 305,634.51 by 1.3219; is that correct? A. No, that 404,013.04 is the addition or actual overhead shown on the Exhibits X-1, X-2 and X-3. Those figures in that column for January, February, March, June and November are copied directly from the Exhibits X-1, X-2 and X-3. That "404" is merely an addition of those 5 items.

Q. Now, referring back to page 6, as I understand your method of computation, it was to take the production for the entire **(83)** period of June 16, 1925, to December 31, 1925; and to take the average burden ratio for that period in obtaining your burden figure as given in page 6; is that correct? A. Yes; and as used in page 5 in getting totals. Page 6 merely determines the cost under various conditions per shaft which is used on page 5 to determine the total.

Q. Now, that figure of yours, let us consider that period from June 16, 1925, to November and December, 1925, the percentage of burden for the months of October, where you had the production over 200,000, for those months it was quite a little less than the figure of .9227,

was it not? A. Yes, but may I say this is a weighted average; that means that the "two hundred and twenty-seven thousand" is given much more weight in this average than the "ninety-two thousand," for instance. This is not what they call a "Dutchman's average"; it is a weighted average.

Q. But where the production dropped down and you figure an average burden, doesn't it make the burden much higher than the actual burden for those particular months? A. For some it is lower and some higher, but it makes no difference to the average way of getting it, because when you have a large number of shafts that gets more value in determining an average than when you have a small number of shafts, and the averages are used. You can multiply those out individually and the difference one way or the other would be relatively trifling.

The Master: By what method did you weight the average?

A. I took the total labor shown and divided it into the total **(84)** burden shown for all the periods given. I might say—we have practically everything from 1925 by those cost summary cards, but, unfortunately, for 1926 you have not as many months; you have not December or the middle of the year which, in most periods, are the low months. You just don't have them. Therefore, if anything, based on any normal ordinary method of ordinary factors, those ratios are lower than they would be if you had the complete year, because the dull months always run an average up.

Q. (By Mr. Farley): But, when you increase the average that way and multiply it by the larger production, the larger productive months, tends to increase the burden figures quite materially? A. No, it rather tends to decrease them, if anything. It doesn't make much difference. Generally you use a weighted average always; you give a value in proportion to the number of shafts; to each one of them.

The Master: In getting your 132.19 figure for the year 1926, then, that does not represent the addition of these burden percentages for individual months divided by 5; it rather represents the three hundred and five thousand and a fraction figure divided into four hundred and four thousand?

A. Yes. If you wish to do some figuring overnight, you can take each one of those individually and multiply them out, and you wouldn't have much difference.

Q. (By Mr. Farley): Then, as I understand it, your figures here **(85)** on page 5 are obtained by taking this weighted average in each year and obtaining the burden cost by multiplying—that is, the sum total of cost by multiplying by the production for that month? A. Well, I obtain—

Q. (Interposing): For the entire period. A. I obtained the burden cost per year for the year by multiplying the labor rate for that year by the average ratio for that year. Just bear in mind, if I may clarify it a little, how would you suggest that we would get the intervening months when the defendant has produced no overhead figures for anything but 5½ months? How would you get the intervening months?

Q. You didn't take into consideration the practice prevailing in the defendant's plant of using the last average burden figure? A. I did not, because they did not do that throughout. The last prevailing figure was quite high. There is one case where you would have used 225 percent for a year if you had done that—something like that. It would have been absolutely unfair. If you could get your figures you would find this is giving a lower burden ratio than if the figures were available for each month. There is no question it is lower. Not, perhaps, in the months in which you had the data, 1929 and 1930, but for any months the rest of those years, undoubtedly, those burden ratios would be higher if you had your dull months in there. I think your own accountant would bear that out.

Q. But, in the months where the figures were fairly completely **(86)** available, the results obtained by you were more unfavorable to the defendant than if the actual figures had been taken? A. No. Some would have been a little more favorable and others a little less. In the higher months they would have been higher; and, in the small, lower, but they would average close. You can readily take those figures here that are complete, and if you use the same figures I have and extend them, you will see how much difference it would make. It would be trifling.

Q. However, the thing that strikes me at first glance is the year of 1925 where, for the last two months, the fig-

ures for October and November, the production for those two months is equal to the—practically, to the four months preceding? A. Yes.

Q. And for those two months the burden rate is considerably less than 92.27, whereas you have used a higher figure? A. It is a little less, but bear in mind, for instance, the "212" month, the last month, has over twice the value in determining that average than either the first or third months have because it is a weighted average. Your difference would be insignificant; maybe a little more in one month, and a little less in the other, but that difference isn't so great even in that one month.

Let us take the "222,950" month. (The witness figured with pencil and paper.) It would be really 88 in that one month against 92. But, if you take one of the other months, the "172,650," which is not much under, and divide .2960 and .3271, you got 110 percent, and yet you only **(87)** use 92.27 for those. I suggest, you can resolve these very readily by having those all extended and find out what difference there is.

The Master: From a theoretical standpoint, which type of calculation do you think is the most accurate?

A. I think the annual one, your Honor, for the reason that in plants generally, owing to seasonal conditions, burden is considered on an annual basis. The reason for that I can cite by one very simple illustration. An element of burden is repairs. Now, when things are running full, a plant very seldom gets a chance to make repairs on machinery; they go ahead and use it until they get pretty bad if their production is right up to 100 percent. But, during the dull months a lot of these machines would be repaired. That is caused by the heavy months' activities, but it occurs in the dull months. Naturally, while that is part of the expense caused by the heavy months, it is incurred in the dull months when they have time for repairing. That is one way in which they spread labor today so that we get more and more, so that overhead actually incurred in one month is not necessarily caused by that month's operations. For that reason accountants and cost men prefer to take an annual burden rather than a month, because that averages all these conditions fairly well. That is why the

annual method is much fairer than using an individual month which fluctuates for all sorts of causes.

Q. (By Mr. Farley): Of course, that statement just made by you is not based upon any knowledge on your part of any practices in the Ford Company? **(88)** A. It is based on good accounting practice, as I see it.

* * * * *

(97) Cross Examination by Mr. Farley (Continued).

Q. I assume, Mr. Moise, that you are aware of the fact that these proceedings here are designed to place the facts before the Master as to costs as accurately as possible? A. Oh, yes.

The Master: Answer out loud, Mr. Moise.

A. Yes.

Q. (By Mr. Farley): Now, if we assume that it is the fact that in the operation of the Walcott machines at the Ford Motor Company, a straightening operation was needed to fit the shaft for the turning operation, and that such a **(98)** straightening operation was not needed on the cam shapers, that straightening operation should be included as a part of the cost, should it not, for the Melling machine? A. If so established for T-410.

Q. Now, will you turn to your Exhibit B, page 6, and in the fourth column from the right-hand side you have taken a figure of man hours per shaft of .01333, that is correct, isn't it? A. Yes.

Q. Now, if, as shown in Defendant's Exhibit 14, I call your attention to operation 12, straightening, .50. A. Yes.

Q. Will you take that figure, .50, and compute the figure you would get figuring man hours per shaft in the same way you obtained the figure .01333? A. It would be 5/8 of whatever the other is; I can tell you how much difference it would make in the whole business, if you want.

Q. I want you to make that calculation, first, how would you determine man hours per shaft taking the time one-half minute? A. Taking the time of one-half minute?

Q. Yes. A. Well, exactly the same way that this is with 80 minutes, which is determined here, I haven't the working papers with me, .80 minutes per shaft would be

divided by 60, which gives .01333. Now, if you divide 50 by 60 you get .00833. .00833 that would make, subject to correction, I think that is right, which if that is included would make in place of—

(99) Q. If you add that figure, .00833 to the figure you have, .01333, what would be the result? A. .02166.

Q. Would you mind jotting that figure .02166 on your sheet there above the figure .01333 in the fourth column? A. Sure.

Q. Now, will you figure the productive labor and the —now, your productive labor figure in that line, in the next column to the right, is .010855, isn't it? A. Yes.

Q. And if you take the figure man hours per shaft, .02166, as you just penciled it in, and you multiply that by the productive labor rate per hour which you have given in column 2— A. Yes.

Q. —that is the second column, will you do that, please? A. That gives .017638.

Q. Now, will you do the same thing for the burden—

The Master: Just a minute.

A. I will check them in total when I get through.

Q. What is your next figure for the third column for the burden? A. .019987, but I want to verify that.

Q. Yes, I think your calculation is off there. A. I get the same thing, but there is some mistake in that.

Q. You want to multiply .01333 by .7514. A. Wait a minute. That labor figure is wrong. I added the difference. That labor figure should be .017637. No, it should be .016275, I beg your pardon, that is the burden figure, .016275.

(100) Q. Now will you add—

Mr. Spohn: Is that the burden figure?

A. .016275.

Q. Will you add those two figures and place a total in pencil in the last column? A. .033913, which proves across.

Q. Those figures, therefore, show if you compare the total in the last column on the right-hand side of the page with the 6th column from the left-hand side under the heading "With Ford cam shapers, cost per cam shaft, total," .031314—excuse me, 7th column from the left, it shows a

greater total per unit, the figure .03389, no, the total .031314, isn't that correct? A. Yes, if you accept that as you have stated it, which I do not.

Q. Incidentally on that point I understood you to say you do not know anything much about machines or machinery? A. I am not an expert.

* * * * *

(101) Q. (By Mr. Farley): Now, will you take your total on page 3, total cost of Melling cam lathes, of $85,382.33, and modify that cost with the figure obtained, or the total per unit of .03389?

* * * * *

(103) A. Subject to later verification—did I understand you, Mr. Farley, you wish the total cost for all T-410 shafts with the Melling cam lathes if that operation is included?

Q. Yes, based on the figure you just obtained of .033913.

Mr. Spohn: May I ask a question here, Mr. Farley, to see if I understand the question too? What you want is $85,382.33, the figure appearing on page 3, that Melling cam lathe total cost, multiplied by .033913.

Mr. Farley: No, divided by that first.

A. Including the straightening operation at fifty one hundredths of a minute, the total cost of all model T-410 made with the Melling cam lathe would have been $139,915.18, subject to later correction.

Q. Well, Mr. Woehrle has a somewhat different figure, $138,736.57, **(104)** and you get the figure of 139, is that right? A. $139,000. Mr. Woehrle is very likely correct, he had available office machines which I haven't.

Q. I think that he did the figuring on the pad just the same time you were doing it right here. A. If Mr. Woehrle has figured that carefully, I will be willing to accept his figures for a moment.

Q. Now assume the figure of 138,000 then is correct—A. What is his exact figure?

Q. $138,736.57, assume that figure is correct, then the third column, or rather the last column, the right-hand column on page 3 entitled "Saving through use of Melling cam lathes," $42,719.94, would have to be changed to a

loss of approximately $10,000, would it not? A. Yes, $10,634.30.

Q. Now I assume you were present when Mr. Watts made his opening statement about this standard of comparison? A. Yes.

Q. And might I first ask if you have had any experience in patent accountings before? A. Very limited.

Q. Are you familiar with the doctrine of standard of comparison? A. With the what?

Q. With the doctrine of the standard of comparison as stated by Mr. Watts. A. Yes, I think so.

Q. And that is that the standard of comparison is with any known and the best known means available to the public at the time **(105)** of the alleged infringement? A. Yes.

Q. Now I think I asked you yesterday who told you to use the Landis grinders in comparing costs between model A shafts and Melling cam lathes? I do not think you answered that question. Would you mind answering it today, please? A. Well, I can answer that question this way; I took the grinders—

Q. Just a moment, please. I asked you who told you to use the Landis grinder. A. No one.

Q. Very well, you have answered the question, you can proceed if you want to. Well now, if we assume that the model A shaft could have been made on the cam shaft shaper, then your comparison of the Landis grinders would also have to be modified, would it not? A. If that assumption is granted, why, of course.

Q. And if the comparison between the cam shapers and the Melling cam lathes on the model T shaft showed a loss of $10,000, wouldn't the same general factor prevail as far as the model A shafts are concerned? A. Under the premises you stated, yes.

* * * * *

(123) Q. Will you turn to page 9 of your report, Mr. Moise, and I note that you state in the second column "From data supplied June 1, 1938, by defendant (Exhibits X-1, X-2, X-3)." For the month of March, 1926, you used the burden percentage of 187.70? A. Yes.

Q. Now, for the month of March, 1928, you have used the suggested percentage of 176? **(124)** A. Yes.

Q. I am just curious as to why when you used the suggested percentage of 176 which was used by the Ford Motor Company for March, 1928, you did not use the 150 percent which had been employed by the company in March of 1926, but used the 187.70. A. The Ford Motor Company used 176 apparently because they had reason to believe that that particular month of 211 was distorted, and Mr. Hovis stated that when overhead ratio was clear out of line they sometimes disregarded it and used another figure, so we just used the Ford procedure as noted.

Q. You followed it in one month but refused to follow it in the other? A. We followed it in all as far as I know where they were given. All those cost summary cards which we made ourselves are from there, Mr. Farley.

Q. Here is a copy of Exhibit 3 and you will note for the month of March, 1926, it states in brackets that 150 percent was used instead of the 187.70. A. Oh, yes, I stand corrected on that one thing; we did not use a percentage that was so very much below large production months which was at that time, the other we did use 176 because it was somewhat in line with some other percentage, but the 150 was below anything shown by them for even on good-sized production months. We could not use that because it was out of line with everything they had shown before.

(125) Q. You state that is so out of line with anything that you had seen. I just direct your attention to the month of March, 1927, which shows 133.38 percent. A. Yes, I am talking about anything like the same period. That is 1926, January, February and March show 169, 168, 188, practically, and then they use 150 percent.

Q. Yes, but March of 1927, they have 133 percent. A. Conditions might be entirely different in another year, that is a period closely approximating that. There is no card given, no record given within that year that even comes close to 150 percent.

* * * * *

(133) Q. It is your opinion that a time study with a stop-watch, as shown on this time study sheet then dated July 1, 1931, is a more accurate way of determining the performance of the machine than a statement of Mr. Wibel when he testified, is that the idea? A. Yes, sir, afterwards

as to the speed, yes, I would prefer to take a time study that is definite and at a given period as to the speed of machines.

* * * * *

(138) Re-Direct Examination by Mr. Spohn.

* * * * *

(139) Q. Now, Mr. Moise, yesterday counsel examined you, at least, with respect to your computation of burden set forth on page 5 of your report, and the supporting schedule. Have you, since yesterday, had an opportunity to make a computation of the burden by taking month by month figures where available, and where not available for particular months, taking the last prior month available? A. I have.

Q. Now, subject to such verification as you may want to make of those figures after checking the same, do you have an opinion as to whether or not the use of the month by month computation as made by you in the manner in which I have stated would have changed the profits which you have set forth on page 1 of $795,169.95? A. According to the un-checked calculations I made it would have increased the profit by approximately $4,000 to have used the monthly basis where available, and I think the last month where there were no burden calculations available for any **(140)** particular month.

Q. In spite of that calculation indicating that increased profit, do you have an opinion, as an accountant, and from your experience, can you state which of the two methods will more clearly reflect profits? A. I consider that the annual method would more clearly reflect profits, and if desired I will explain why.

Q. You may state why. A. For the reason that one month is very likely to be distorted by excessive repairs, or lack of repairs, or various other things, adjustments that are made annually; all of which go into an annual statement. When you are using certain selected months as illustrative of a whole year, you may miss altogether the months in which adjustments have been made or heavy repairs have been made, or you may miss months in which very light repairs have been made; but, generally speaking, in this instance, in this case, the months that are

omitted are the normally smaller production months for automobiles, and the smaller months as shown by the production in this case. Therefore, if we had complete records of burden and labor for every month, I think it can be stated almost positively that the average burden rates for the years would be higher, but I do not believe in using individual months because they do not recognize those annual factors of which I have spoken.

Q. When you say the average burden rate would have been higher, you mean higher than the averages which you used? A. Higher than the averages which I used.

Q. Now, isn't it a fact that the use of those higher averages in **(141)** those cases would have increased the profit here? A. It would.

Q. Now, Mr. Moise, can you state the principal elements or bases upon which your report in this case proceeds? A. Yes, I think I can. Based, first, on the production of shafts. The production of shafts was, in all cases, taken from the records furnished by the defendant. Second, on the speed of production with different machines. That, again, was taken from testimony for T-410 and F-446, and calculated to the best of my knowledge because there were no records for A-6250 for that particular shaft. Now—

Q. (Interposing): Any other bases? A. Any other elements? Oh, yes. That has to do with the speed. Then, there is the average rates for productive labor which, again, were taken from exhibits amended furnished by the defendant. The fourth is the burden rate. In each case that was taken from information furnished by the defendant.

Q. And your computation of burden was on an annual basis? A. My computation of burden was on an annual basis.

* * * * *

(145) Re-Cross Examination by Mr. Farley.

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(146) Mr. Farley: There was one question I neglected to ask upon the cross examination, and if there is no objection I would like to ask it now.

Mr. Spohn: I would like to reserve my objection on that until I hear the question.

Q. When I went over with you the correction of the cost as set forth in your sheet 6 to include the straightening operation on which you jotted down on the exhibit the pencil figures, I neglected to ask you with respect to your computations under the heading with Melling lathes for the model A cam shafts **(147)** and the model tractor F-446 shafts, that if the same corrections were made to include the straightening operations it would also increase the cost in about the same proportion as in the case with the model T, would it not? A. You asked me that this morning.

Q. I don't think I did on the model A. A. Anyhow, I don't mind answering it again. Of course, it would increase them all. I don't know whether in exactly the same proportion or not, but it would increase the cost on the Melling lathe in all cases they were used if the straightening operation was included.

Mr. Farley: That is all.

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(152) CHARLES GORDON was thereupon called as a witness on behalf of the plaintiff herein, and having been first duly sworn, testified as follows:

DIRECT EXAMINATION by Mr. Spohn.

Q. Your name is Charles Gordon? A. Yes, sir.

(153) Q. Are you the same Charles Gordon who testified heretofore in this proceeding in evidence taken before the Honorable Judge Tuttle? A. Correct.

Q. Mr. Gordon, what would determine the turning time required to turn the cams on the T, A and F shafts turned by the defendant on the infringing Melling machines? A. What would determine it?

Q. The turning time. A. The turning time?

Q. Yes. A. The area; that is, the surface area of the cams.

Q. Would actual turning time required to turn the cams on the T, A and F shafts by the defendant on these infringing machines solely determine the production of shafts per hour? A. Oh, no.

Q. What other matters other than the actual turning time? A. There would be the loading, unloading and lost time that, I think, would be constant in all three shafts; very closely.

Q. Could the defendant have ground the A, T and F shafts on a Landis grinder? A. Yes, sir.

Q. Do you know whether they ground any of those shafts on the Landis grinder? A. They ground the "F" shafts on the Landis grinder, to my knowledge; to my personal knowledge.

Q. And you say they could have ground the other two shafts? A. Yes.

(154) Q. What would enter into the determination of actual grinding time to grind the cams on the T, A and F shafts on Landis grinders? A. The area of the cams would have a large bearing in it, and, of course, the thickness or the depth of the metal, with the excess metal that had to be removed, would be a large factor. But, assuming that the depth of the metal was approximately the same throughout on all of them, the area would determine very largely what production they could get.

Q. Would the actual grinding time required to grind the cams on the T, A and F shafts on Landis grinders solely determine the production per hour? A. No.

Q. What other matters other than actual grinding time would have to be taken into consideration? A. Loading, and unloading, and lost time. That would be very similar in all three cases.

* * * * *

(163) Mr. Spohn: If your Honor please, I have three more exhibits which have been marked for identification as Exhibits "FF," "GG," and "HH." I want to state to your Honor and counsel the purpose of this offer so there will be no misunderstanding. The purpose of the offer is solely on the question of reasonable royalty—after I have had the instruments identified before the offer is made. The offer, when made, will relate solely to the question of reasonable royalty in this case. I will identify them first.

Q. Now, Mr. Gordon, I show you a single typewritten sheet designated as Exhibit "FF," purporting to be signed by the Gordon Form Lathe Company by Charles Gordon,

president. Is that your signature (handing document to witness)? A. Yes, sir.

Q. Is that an original instrument? A. That is a carbon copy.

Q. Is it a duplicate original? A. Yes, sir.

Mr. Spohn: It is a written instrument, your Honor please, so I will read it. "For and in consideration of $1055.28 figured at the rate of three-quarters of a cent per cam on a total production of 140,704 cams turned on infringement machine intervening between November 22, 1928, **(164)** the date of the first installation, and February 18, 1930, the date of this release, the under-signed, the Gordon Form Lathe Company, an Ohio corporation, owner of the entire right, title and interest in and to Letters Patent of the United States, No. 1,542,803, dated June 16, 1925, covering an improved lathe hereby releases and forever discharges the J. I. Case Company, a Wisconsin corporation, of Racine, Wisconsin, from all claims and demands for past infringement of said patent by reason of its use of the two four-cylinder cam shaft type infringing lathes identified in an agreement of even date herewith releasing said machines for future use."

Q. Did the Gordon Form Lathe Company, the plaintiff in this case, receive the check therein referred to of $1055.28? A. They did, yes.

Q. Did you tender this release to the J. I. Case Company as indicated in the release itself? A. Yes, sir.

Mr. Farley: If your Honor please, I am going to object to the introduction of that, and I am going to ask that the part that Mr. Spohn read into the record be stricken. It is an attempt to go in the back door, we might say, of inadmissible evidence. The Supreme Court has laid down the rule very strongly in the case of *Rude versus Westcott*, 130 U. S., that evidence concerning past settlement or past infringement is not admissible in an accounting proceeding to allow reasonable royalty, or established royalty, or the like.

* * * * *

(173) The Master: Suppose, as I get on this other question, I reserve a ruling on the issue of admissibility but permit the plaintiffs today to go ahead and question, and the defendants to cross-examine the same way as they would as if the evidence were admitted, and then I can make a ruling when I have more opportunity to study these cases here.

(174) Mr. Spohn: Under your Honor's ruling I will offer in evidence Exhibit "FF," subject to your Honor's ruling, of course.

Q. Now, Mr. Gordon, I show you a paper marked for identification as Exhibit "GG," purporting to have the signature of the Gordon Form Lathe Company on it, and signed by you, and ask you if that is your signature (handing document to the witness)? A. It is.

Q. Is that a duplicate original? A. It is.

Mr. Spohn: I will read Exhibit "GG" in evidence.

"For and in consideration of $2450.92, the undersigned, Gordon Form Lathe Company, an Ohio corporation, owner of the entire right, title and interest in and to Letters Patent of the United States, No. 1,542,803, dated June 16, 1925, covering an improved lathe hereby releases and forever discharges the White Motor Company, an Ohio corporation, of Cleveland, Ohio, from all claims and demands for past infringement of said Patent No. 1,542,803, by reason of its use, and the two four-cylinder cam shaft type infringing lathes identified in agreement of even date herewith releasing said machines for future use.

"Dated this 28 day of December, 1929, Gordon Form Lathe Company, by Charles Gordon, president."

Corporate seal affixed.

It is a release given to the White Motor Company. The other was the Case Company.

(175) Q. Now, Mr. Gordon, I show you a letter marked for identification as Exhibit "HH" today purporting to be on the stationery of the White Motor Company, and I will read that letter in evidence. The title:

"White Motor Company,
"Manufacturers of White Trucks and Busses,
"Cleveland, Ohio,
"December 24, 1929.

"Mr. J. W. Michael,
"Bottman, Hudnall, Lecher, McNamara & Michael,
"Trust Company Building,
"Milwaukee, Wisconsin.

"Re: Gordon Cam Lathe Patent.

"Dear Sir: Your letter of December 16, 1929, has been received.

"We would like to effect a settlement both for the past and the future, and are herewith submitting the data which you requested during our discussion of this subject in Mr. Richey's office.

"Number of crankshaft contour machines owned by the White Motor Company—none.

"Number of cam cutting machines owned by the White Motor Company—two (both of the four-cylinder cam shaft type).

"Number of cams cut prior to July 1, 1925,—none.

"Number of cams cut from July 1, 1925, to June 12, 1929 (thirty-seven thousand, nine hundred nineteen cam **(176)** shafts)—303,352.

"Number of cams cut from June 12, 1929, to December 21, 1929 (3,013 cam shafts)—24,104 if extended.

"We do not believe that we were given proper and adequate notice of the infringement prior to June 12, 1929, but in order to effect an early and complete settlement of this matter we are willing to pay the Gordon Form Lathe Company the sum of $5,000, the same to cover both damages and the future releases of our machines.

"Please let us have an early reply.

"Yours very truly,
"The White Motor Company,
"R. M. Cooper (typed),
"Patent Engineer."

Q. Mr. Gordon, did you receive a check from the White Motor Company for $2455.92 referred to in Exhibit "GG"? A. I did.

Q. Do you know the basis upon which that money was paid? A. That was paid on the basis of three-quarters of a cent a cam.

Q. And was reference made to the number of cams set forth in this letter of December 24, 1929, 327,456? A. That is correct.

Q. I am not sure, Mr. Gordon, whether I asked you if you received the check for $1055.28. A. Yes, you did.

Q. Referred to in Exhibit "FF"? A. Yes.

(177) Q. When I say "you" I refer to the plaintiff the Gordon Form Lathe Company. A. Yes.

Mr. Spohn: I offer in evidence Exhibits "GG" and "HH."

The Master: Ruling is reserved on them.

Mr. Farley: Of course, my objection is on the record.

The Master: Yes.

* * * * *

(178) Cross Examination by Mr. Farley.

Q. Mr. Gordon, when has your company sold your last cam shaft machine? A. I don't remember the date, but it was prior to 1925.

Q. Prior to the granting of the patent? A. Yes.

Q. How many cam shaft turning machines did your company sell? A. I wouldn't remember the exact number, but I think it was in the neighborhood of 30 cam shaft lathes.

Q. Cam shaft lathes. How many crank cheek lathes? A. I think there were 10 or 12; I don't remember.

Q. 10 or 12? A. I don't remember the numbers.

Q. Let me ask, in the case of any of the cam shaft lathes which you sold, did you ask or obtain a royalty from the purchaser of three-quarters of a cent a cam for the use of that machine? A. Of the cam shaft machine?

Q. Yes. A. At the time of sale or—

Q. At the time of the sale. I am not speaking of these; I am speaking of lathes sold by the Gordon Company. A. No.

Q. In no instance did you get from any purchaser three-quarters of a cent a cam for the use of the machine? A. At the time of the sale.

Q. Or at any other time as far as your Gordon machines were concerned? **(179)** A. You mean continuous beyond these settlements?

Q. Settlements haven't anything to do with it. We are talking about Gordon machines; the settlement refers to Walcott machines.

Mr. Spohn: Is the question limited strictly to the Gordon machines, counsel?

Mr. Farley: Yes.

Mr. Spohn: Objected to as incompetent, irrelevant and immaterial; not within the issue.

A. No, we did not.

Q. As to the Gordon machines you sold them outright for a lump sum? A. We did.

Q. And some of those machines were made by some other machine company? A. Willard Machine Tool Company.

Q. Did that company pay you a royalty for the machines? A. No, sir.

Q. Did you, as the inventor, get a royalty from the Gordon Form Lathe Company?

Mr. Spohn: Just a moment, I object to this examination; that is not the issue here.

The Master: Well, the Gordon machine and Walcott machine are both designed for the same purpose, and they are closely enough related so that the Gordon machine was held to infringe the Walcott machine. Wouldn't the question of what royalties were received upon the Gordon machines have some bearing upon a reasonable royalty?

(180) Mr. Spohn: The testimony is he sold the machines outright.

Mr. Farley: It has a decided bearing on this question of reasonable royalty.

The Master: I will overrule the objection.

Mr. Spohn: Read the question, Mr. Reporter.

(The question was read by the reporter.)

A. No.

Q. (By Mr. Farley): And, you never asked or requested from any purchaser of your machines a royalty of so much per cam for the cams that were turned upon your machines, is that right?

Mr. Spohn: Just a moment, I raise the same objection.

The Master: I will overrule the objection. I think you can bring that matter out on argument or redirect examination.

A. No.

Mr. Farley: That is all.

RE-DIRECT EXAMINATION by Mr. Spohn.

Q. Mr. Gordon, the Gordon Form Lathe Company, the record shows, has the title to the patent in suit? A. They have, yes.

Q. And you are a stockholder of that company? A. Yes, sir.

* * * * *

(204) CHARLES GORDON was thereupon recalled for further examination, having been previously duly sworn, testified further as follows:

RE-DIRECT EXAMINATION by Mr. Spohn.

Q. You are the same Charles Gordon who testified yesterday in these proceedings? A. Yes, sir.

Q. Now, Mr. Gordon, do you recall the last machine made under your patent by your company? A. I do.

Q. And what machine was that? A. That was a machine that was tested out at the Ford Motor Company.

Q. Was that prior to or subsequent to the issuance of the patent? A. That was prior to the issuance of the patent.

Q. And can you fix the time when that machine was being tested by the Ford Motor Company? A. Well, I cannot say positively. It was around 1924.

Q. Was that machine ever sold? A. It was not, no.

Q. Why didn't your company, after the issuance of your patent—strike that—after the issuance of the patent why was it that your company did not manufacture or

sell any machines under the patent? A. Well, we felt that the competition that we were up against with the Melling people made it so that we did not feel it would be profitable.

(205) Q. Did the purchase by the defendant company of the Melling machines set forth in this record in 1924 have any part in contributing to your determination not to manufacture and sell? A. Yes, I think that is what finally determined that we would not go ahead manufacturing any more.

Mr. Spohn: That is all, Mr. Gordon.

Cross Examination by Mr. Farley.

Q. As a matter of fact, Mr. Gordon, the machine you had at the Ford Company proved to be very unsatisfactory, did it not, to the Ford Company?

* * * * *

(207) A. The only thing I can say is that the Ford Company did not accept the machine. I do not know anything beyond that.

Q. (By Mr. Farley): You do not know anything beyond that? A. I say I do not know anything beyond that in reference to that question.

Q. Why did your company take the machine out of the Ford plant and take it back to some other place for reconditioning, or whatever work you did do on it? A. Because there was defective parts in the machine and we wished to correct them.

Q. To that extent then, you yourself realized the machine was unsatisfactory, that is correct, isn't it? A. Not any more than any machine, defective parts in those machines might be a reason for a desire to take them back.

Q. I will ask that question again, and I would like to have you answer it with a "yes" or "no" answer, please. To that extent the machine was unsatisfactory in so far as you were concerned, because you took the machine out and did further work on it?

* * * * *

(209) A. Yes.

Q. Now, Mr. Gordon, how long was the Gordon Company in operation, the Gordon Form Lathe?

* * * * *

(210) A. If I remember correctly it was organized in 1921. I am not sure of that date, but it is still in existence.

Q. (By Mr. Farley): How long did the Gordon Company operate as an operating company that were building and selling machines from 1921 to what date? A. About 3 years, as I remember it. They did later furnish parts for machines that were out.

Q. And you operated until some time in 1924. Now, do you recall when the machine you were questioned about at the Ford Company was sold by you to the Ford Company, or, rather, was introduced into the plant of the Ford Company, let us say? A. No, I have no clear recollection of those dates.

Q. There was introduced in the trial below, Mr. Gordon, an order of the Ford Company directed to the Motch & Merriweather Machine Company, which was dated 6-2-22. I will let you see that. That was introduced as Exhibit 56. Were **(211)** you familiar with that order? A. No, I was not.

Q. I understood your testimony to be that the last machine that was made by the Gordon Form Lathe Company was the machine which was sold to the Ford Motor Company. Does that refresh your recollection as to the date of manufacture of that? A. No, it does not, because I was not active in either the selling or manufacturing at that time. I was located in Milwaukee and the manufacturing was done in Covington, Kentucky, and the sales organization was, their headquarters was in Cleveland, and I did not know of any of the detail of that that was going through.

Q. This Exhibit No. 56 shows a stated purchase price of the Gordon cam shaft turning lathe as $4,335. Does that conform with your recollection of what you sold those machines for? A. I think that that was the price.

Q. And did you sell practically all of the Gordon machines at about that same price, the cam shaft machines? A. I think that was considerably lower than any other sale we made.

Q. And as I recall your testimony you stated that you had sold some 30, I think it was, of the cam shaft turning machines during the period from 1921 to 1924, you say that period was? A. The first machine that was sold I think

was sold in '19 or '20, but that was before the organization of the Gordon Form Lathe Company.

Q. Well now, your answer isn't quite responsive. I do not think you intentionally refrained from answering. My question was **(212)** directed to the number of machines, about 30 cam shaft machines. A. About 30 cam shaft machines were sold.

Q. And just what profit did you make off of those machines, Mr. Gordon? A. Well, I am unable to tell you.

Q. You do not recall that? A. I had nothing to do whatever with the accounting of the concern and as I say I was not even located there.

Q. Did the Gordon Form Lathe Company operate at a profit in those years from 1921 to 1924? A. I couldn't say positively whether they did or not. I am not enough familiar with—

Q. Have you any records of the Gordon Form Lathe Company, are they still in existence? A. We have some of the records.

Q. Could you produce the records that would throw some light on this question of the profits made by the company? A. Well, I don't know what they would show. I have some records and just what they consist of I don't know.

Mr. Farley: Now, if the Court please, in view of the question asked by Mr. Spohn and the testimony of the witness, I now make formal demand on the plaintiff for the production of the records of the Gordon Form Lathe Company because—

Mr. Spohn: We have no objection—

Mr. Farley (Continuing): —because I think the question of profits at which the company might have operated I think has more bearing than the self-serving testimony and self-serving **(213)** declaration of the witness that purchase by the Ford of the machines drove them out of business.

Mr. Spohn: We have no objection, we will be glad to produce all the records we have bearing on the subject.

* * * * *

(214) Q. (By Mr. Farley): You were notified by the Ford Motor Company before this incident occurred of tak-

ing the machine out which your company did for overhauling, or whatever you did with it, you were notified by the Ford Company that the machine was not operating satisfactorily, weren't you? A. I do not personally know, but I would expect they did; I would assume they did. I did not have any of that correspondence myself.

Q. Now, you testified on the prima facie case that you yourself spent 3 weeks at the plant of the Ford Company, shall I say "nursing" that machine, probably you did not use that language, but attempting to make that machine operate satisfactorily? A. Among other things. I had a great many other things to do there that had no connection with the machine.

(215) Q. But you did spend some three weeks in the Ford plant in and about that machine? A. In the Ford plant, yes, sir.

Q. And a great part, or a certain part of that time was work in connection with attempting to make the machine operate satisfactorily, isn't that true? A. In a sense that is true, but most of the time was spent in trying to get the material that was to be put into the machine in shape so that any machine could operate it satisfactorily.

Q. I see, but all the work that you did there at the Ford had to do with the operation of your machine? A. Yes, sir.

Q. And you were advised by the officials of the Ford Company, or at least by the employees of the Ford Company, during that three weeks' period, were you not, of unsatisfactory operation? A. Yes.

Q. And how much after that time you were in there, how much longer did the machine stay in the Ford plant, do you know? A. Well, I think a very short time, but I couldn't give you any period because I just don't remember. It did not come to my direction. The business was handled through the Sales Department and I was not connected with that end of the work at all.

Q. Just when was it that you went to the Ford plant yourself to demonstrate, or attempt to make the machine work satisfactorily; was that after the machine was reconditioned? **(216)** A. Yes.

Q. Or over-hauled. You had something to do, did you not, Mr. Gordon, with the preparing of that machine be-

fore it was sent to the Ford Motor Company, in attempting to equip it to turn the Ford Company shafts? A. Only that I was in the plant when the machine was completed and saw a test run in the plant where the machine was produced, the Willard Machine Tool Company. I would like to correct that. As I remember now, the test that I saw was the test made when the machine was returned and the defective parts were replaced. I think that was the test that I saw, not prior to its first being sent to the Ford Company.

* * * * *

(217) Q. Now, you testified, Mr. Gordon, in the case below in connection with the Westinghouse machine, or I think it was the Stoddard-Dayton machine, after a machine of that type had been demonstrated to the Court, that the machine could not operate efficiently because the tool was not at the correct cutting angle. I am just wondering whether you would be willing to state to the Court what is the limit of error that the tool may have of the type of machine shown in the Gordon patent, what is the limit of error, the maximum error that in your opinion may exist before a machine will operate inefficiently?

* * * * *

(218) Q. (By Mr. Farley): Do you understand the question, Mr. Gordon? A. I think I do. As I understand the word "efficient," is more or less limited. As soon as you depart from the correct position on anything it then starts to become inefficient to that extent. There are certain well-known rules as to cutting tools, what is desirable and what is undesirable, and as soon as you depart from the desirable it becomes to that extent inefficient. It is possible there for a man to do more work with a sharp pick axe than it would be with one that is all worn down. Just at what degree it must be worn down before he ceases to be able to dig a hole, I don't know, never having tried it, but there are certain elements in cutting tools that depart from inefficiency in that tool much more rapidly than others, and different circumstances, different conditions make those things more or less evident.

Q. Now, let's get to it this way; your invention, and a very important part of your invention you conceive to

be that of tilting the tool so that the tool would always remain normal to the work at its point of contact with the work? A. Yes, sir.

Q. Now, how much from that normal stage of the work would you say would be the maximum that can be permitted to use in a machine using the tilting tool before the machine becomes let us say satisfactorily impossible from a commercial standpoint? A. I do not think I can answer that question because the conditions are so entirely different. It depends on where you are cutting, what you are cutting, the type of tools you are able to use, and the Stoddard-Dayton machine that you mentioned, **(219)** there would have been, if the tool had been in contact with the work, it would have been absolutely impossible at many periods during its rotation of the work, it could not have cut at all, it might have pushed off some of the excess metal but it would not have cut it off.

Q. You remember the demonstration of the Stoddard-Dayton attachment that was made during the trial below of the prima facie case? A. Yes.

Q. And you remember after that demonstration was made you prepared a certain sketch which was introduced as Plaintiff's Exhibit 149, as reproduced at page 1026, volume 3, of the record, and I direct your attention to your testimony at page 753 of the record where, in answer to the question of Judge Tuttle, who asked you, "There is no tilting of the tool in this, though," you said, "Yes, there is a very material tilting of the tool, a very erroneous tilting of the tool as it tilts into a very inefficient angle." Now I am wondering if you would tell the Court just how much departure there can be in the angle of the tool from the correct, as you maintain, correct normal angle in your patent at 90 degrees to the surface of the work, the point of contact, how much variation from that 90 degree angle may there be before the tool gets to an inefficient angle that you were talking about to Judge Tuttle below? A. For all practical purposes a slight deviation from a correct angle would probably make a very little difference in the amount of production you could get out of a machine.

(220) Q. Well now, just what do you mean by a slight deviation, say 5 percent, 5 percent or, 2 percent, or what?

A. I would sooner not say in percentage, because that does not mean a great deal.

Q. I mean degrees, I did not mean percent, I meant degrees, 5 degrees. A. Well, under certain conditions 5 degrees would be very material in decreasing the efficiency of the machine.

Q. And could we say that 10 degrees departure from correct angle would be twice as inefficient as 5 degrees? A. Why, it might be 1,000 percent more inefficient than 5 degrees, because it might make it inoperative altogether; there might be that much difference.

Q. Would you venture to say how far you could go, how many degrees you could go from the correct 90 degrees before the machine became absolutely inefficient or inoperative? A. No, I do not think anybody could say that, because it would be a matter of testing with the type of tool and the type of material and the amount of feed; there would be a great many elements enter into that which would determine it. The machine could be run and many machines are run which are very inefficient as far as their cutting efficiency is concerned.

Q. Let me ask you this, Mr. Gordon: Of the 30 machines that the Gordon Form Lathe Company sold from that period, from 1921 to 1923, or 1924, whatever it was, just how many stayed sold? A. Every one of them stayed sold, except the Ford Motor machine. **(221)** I beg your pardon, the first machine that we built was an experimental machine and there were many things on that machine which we changed when we built a second machine, and when we asked permission of the Nash Company to take that first machine away and furnish them a second machine. We did that, and later on we sold them still another machine, but that first machine we took all the elements out of it which were not built to the standard drawings which we prepared, and that machine was sold again as a new machine. I could not remember who to.

Q. And all 30 of the machines, as I understand it, were sold by your company prior to your sale, or attempted sale to the Ford Company? A. They were all paid for.

Q. I say, were they all sold by your company prior to your attempted sale of a machine to the Ford Company? A. Yes, sir.

Q. Was your business in parts rather extensive after you ceased manufacturing new machines? A. That was all that business consisted of at that time.

Q. I say, was it very extensive? A. After that period?

Q. After you stopped building new machines, did you have a large demand for repair and replacement parts? A. No, no, there was a very slight demand.

Q. Now, up to the time you went to the Ford Company had you encountered cams having as sharp a nose on the end of the cam as the Ford cam, or was that the sharpest one you encountered **(222)** up to that period? A. Well, I wouldn't say positively about that, but as far as I can remember there were other cams that were very close to that, dependent, of course, on the general angle, included angle of the nose. It might be a very sharp nose and still have a very wide angle, or it might be a round nose with a very much shorter angle, short angle, lessened angle.

Q. Well, the sharpness of the included angle, as you spoke, and the sharpness or the thinness of the nose of the cam are quite material elements in effecting the difficulty or lack of difficulty in cutting the cam, isn't that true? A. We never felt that way.

Q. Until you went to the Ford Company? A. No, we did not feel like that at the Ford Company, we did not think that had any bearing on it whatever.

Q. Are any of your machines operating anywhere today? A. I don't know.

Q. You don't know that any are operating? A. I have not been in touch with that end of it for many years.

Q. Do you know where you could get one of those machines?

Mr. Spohn: Objected to as incompetent, irrelevant and immaterial.

The Master: Overrule the objection.

A. An operating machine?

Q. (By Mr. Farley): Yes. A. I don't know of any operating, I don't know of any concern who might have one of those machines.

* * * * *

(236) LYLE E. BROUGHTON was thereupon produced as a witness, and after having been first duly sworn, testified as follows:

CROSS EXAMINATION by Mr. Spohn.

Q. Your name is Lyle Broughton, is it? A. Right.

Q. And where do you live, Mr. Broughton? A. Jackson, Michigan.

Q. What is your occupation? A. Manager of the Crankshaft Machine Company.

Q. Is the Crankshaft Machine Company a corporation? A. Yes, sir.

Q. And where is it located? A. Jackson, Michigan.

Q. Does it have its principal office in Jackson, Michigan? **(237)** A. Yes, sir.

Q. And that corporation has changed its name, has it not? A. Yes, sir.

Q. What was its name prior to its change? A. Jackson Shaper Company.

Q. How long has the company been doing business in Jackson, Michigan? A. Since July, 1916.

Q. And how long have you been connected with that company? A. Since October, 1916.

Q. What business does the company pursue? A. Special machines, crankshaft lathes, cam shaft lathes.

Q. Is it a manufacturing company? A. Yes, sir.

Q. You were subpoenaed here today, Mr. Broughton? A. Yes, sir.

Q. May I see the subpoena? A. I will get it (producing paper).

Q. And this subpoena, which you just handed to me, is in this language: "L. E. Broughton, president Crankshaft Machine Company, Jackson, Michigan. You are hereby commanded, laying aside all and singular your business and excuses, to be and appear before the Honorable Donald L. Quaife,"—and I am omitting part of it, your Honor,—"then and there to testify and give evidence in the case"—I am omitting the title—"on behalf of said plaintiff and to bring with you the originals of all letters, telegrams, orders and other papers addressed to Jackson Shaper Company by Ford **(238)** Motor Company and included in the attached photostats, also the Jackson Shaper

Company's retained copies of all letters and other papers addressed by Jackson Shaper Company to Ford Motor Company and included in the attached photostats, also return the attached photostats."

These photostats which you have just handed me, which have heretofore been marked for identification as Exhibit "O," were they the attached photostats that were handed to you by the Marshal? A. Yes, sir.

Q. And you are returning them now? A. Yes, sir.

Q. Under the order of the subpoena. Have you brought with you the originals of all letters, telegrams, orders and other papers addressed to the Jackson Shaper Company by the Ford Motor Company, and included in the attached photostats, also the Jackson Shaper Company's retained copies of all letters and other papers addressed by Jackson Shaper Company to Ford Motor Company and included in the attached photostats? A. No, sir.

Q. Why haven't you brought those? A. I am unable to locate them in the files.

Q. Have you made search for them in the files? A. Yes, sir.

Q. And did you look over these photostatic copies attached? A. Yes, sir.

Q. And have your files been destroyed, do you know? A. Some of the files, the letter files have, some of them, but **(239)** the order files never have. That order copy in there should be in our files. Could I ask a question?

The Master: Go ahead.

A. I would like to ask where these were obtained and what became of the originals?

Mr. Spohn: If your Honor please, that is a fair question, and as to part I can answer him; by asking him a few questions I think it will clear it up.

Q. (By Mr. Spohn): Your full name is Lyle E. Broughton? A. That is right.

Q. And do you remember testifying in an action in the District Court of the United States, Northern District of Ohio, Eastern Division, in which Herman W. Melling was the plaintiff versus The Gordon Form Lathe

Company, defendant; do you remember testifying in that matter? A. Yes, sir.

Q. And I will read to you your testimony and see if that will refresh your memory on that question and answer it. A. All right.

Q. (By Mr. Spohn) (Reading):

"Direct Examination by Mr. Earle.

"Q. State your name, age, residence and occupation. A. Lyle E. Broughton, residence Jackson, Michigan, occupation managing machine shop making special machinery mostly.

"Q. What is the name of that shop? A. Jackson Shaper Company.

"Q. What is the character of machinery which you build? **(240)** A. We build principally in addition to shapers, special machines for doing some special operations, some single operations.

"Q. Please state generally your familiarity with the practice of the Ford Motor Company, particularly in the making of cam shafts for internal combustion engines. A. Well, I some two or three years ago started to build some cam-shaping machines for the Ford Motor Company of their own design, I think.

"Q. Had they been using such machinery prior to that time to your knowledge? A. Yes, sir, they had been using them on the model T shaft.

"Q. What in general is the character of these machines? A. They were an upright machine with a master cam regulating the tool and in place of tool cutting around the cam it cuts cross-ways of the cam like a shaper shaving it off, the cam rotated on this tool, shaves off the metal as the cam rotated in the machine.

"Q. Can you fix the time more definitely when that took place, or the date of your transactions with the Ford Motor Company? A. (After examining papers): The verbal order for the machine was given the 12th day of December, 1923, for five machines. The price was $5,500 each. The actual date of the order, however, was the 18th day of January, 1924.

"Q. And please state what you did in connection with that order. A. Why, I had the machines probably 60 percent completed **(241)** when the order was held up and the Ford Motor Company paid me approximately $20,000 and scrapped the material.

"Q. Do you know why that was done?

"Mr. Ritchie: I object to that, he is asking him why the Ford Motor Company did something.

"The Court: He cannot say anything more than to tell the reasons assigned by the Ford Motor Company; they did assign one cancelling the order—did they assign any reason for cancelling it.

"The Witness: Yes, sir, they said they were adopting the Melling cam lathe.

"Mr. Ritchie: I object to his testifying what the Ford Motor Company said.

"The Court: Oh, it is a fact they assigned. Its probative effect, I should not think as I see the issues here, has any pertinency to any issue before the Court.

"Mr. Earle: I think that will be made clear later.

"Q. Please state whether or not prior to the time that you had seen a Gordon machine in the plant of the Ford Company? A. I saw a Gordon machine in the spring of 1923 in the Tractor Department operating on a tractor cam shaft.

"Q. And that was prior to your receiving this order for shapers? A. That was probably nine months prior to that time, yes.

"Q. Did you ever see the Gordon machine in use in the Ford Company? A. Yes, sir, I was up there and saw it operating, or attempting to be operated.

(242) "Q. With what result? A. Why, the cams were coming with a lump on one side near the point and this lump in the hardening operation of grinding would grind that hard spot and leave a soft spot on the cam.

"Q. Do you know what became of that machine, whether its use was continued or not? A. I do not. The last time I was in that department the machine was not there. I do not know what became of it.

"Q. What kind of machines are they using in that department now? A. Well, I was there some

three or four months ago, they were using Melling cam lathes.

"Q. And what have you to say as to the touring car, you spoke of the tractor, I believe. A. The touring car also was turned on a Melling cam lathe.

"Q. You know that yourself? A. Yes, sir, that is I was there two or three months ago. The last time I was in the plant probably three or four months ago.

"Q. Are these shaping machines you speak of designed for the touring car or the tractor? A. I never heard of them being used on the tractor, they were used only on the touring car, as far as I know.

"Q. This correspondence you have covers the transaction you had with the Ford Motor Company, as I understand it? A. Yes, sir.

(243) "Mr. Earle: The correspondence is offered in evidence as Plaintiff's Exhibit 123, Jackson Shaper-Ford correspondence, relative to cam shapers."

You remember testifying that way at that trial? A. I don't remember—I remember testifying, but I don't remember having the letters there.

Q. If the official report is as I read it would you say that you did produce those letters at that time? A. Evidently, yes, sir.

Q. And those letters may now be in the hands of your counsel, or others in that case? A. I don't know.

Q. You don't know where the letters are at this time? A. No, sir.

Q. You were General Manager, were you not, on March 4, 1924, of the Jackson Shaper Company? A. Yes, sir.

Q. You have gone through these letters, photostats of these letters which were attached to the subpoena? A. Yes.

Q. And do those letters, do you remember any of those letters? A. They look familiar.

Q. Would you say from these photostats that you had seen the originals of those letters before? A. Well, I might have, I could not swear that I had, but they look familiar; it is a long time ago.

Q. And the order also dated the 18th day of January, 1924, looks familiar to you, does it? **(244)** A. Yes, sir.

* * * * *

(246) Q. (By Mr. Spohn): Now, Mr. Broughton, you remember this transaction, do you, building those machines? A. I do.

Q. And the cancellation of the order? A. Yes, sir.

Q. And the payment of the $20,000, or approximately $20,000 to you, by the Ford Motor Company? A. Yes, sir.

* * * * *

(247) Mr. Spohn: I will offer Exhibit "O" in evidence.

Mr. Farley: No objection in view of the circumstances, except the other objection I made to the materiality and relevancy of the subject matter.

The Master: It is admitted.

* * * * *

(257) The Master: Mr. Gordon, did you sell your machines entirely to manufacturers in the automotive industry?

* * * * *

Mr. Gordon: It developed at that time we had worked that field because that was the field that we started out with, and they were the people who were so keenly interested in getting something to supplant the type of machine that had been used before. There was a tremendous demand for a machine **(258)** that would do that work and supplant the grinder, which was the tool that was used almost universally; used practically by everybody except the Ford Company who used the shapers.

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(261) Howard Jones was thereupon called as a witness on behalf of the Plaintiff, and having been first duly sworn, testified as follows:

Direct Examination by Mr. Spohn.

Q. Your name is Howard Jones? A. Correct.

Q. Where do you live, Mr. Jones? A. 1920 Seneca Drive, Euclid, Ohio.

Q. Cleveland, Ohio? A. Euclid, Ohio.

Q. Do you have any reticence about telling us how old you are? A. Forty-two.

Q. Forty-two years old? A. Yes.

Q. You are here under subpoena, are you not? A. Correct.

Q. Mr. Jones, what is your occupation? A. Factory Manager, of the Units Division, of the White Motor Company.

Q. Where is the White Motor Company located? A. On East 79th Street, Cleveland.

Q. Here in Cleveland, Ohio? A. Yes.

Q. What business is the White Motor Company in? **(262)** A. The manufacture of trucks and busses.

Q. How long have they been engaged in that business, if you know? A. Since about 1915.

Q. How long have you been connected with the White Motor Company, or associated with it? A. Since 1925.

Q. What are your present duties with the White Motor Company? A. I am Factory Manager of the Engine, Axle and Transmission Departments.

Q. How long have you had that duty? A. For the last five years.

Q. Prior to that time what were your duties? A. I was shop engineer, in charge of all equipment and manufacturing methods, and time studies.

Q. Does the White Motor Company manufacture cam shafts? A. Yes, sir.

Q. And has it done that since you have been connected with the company? A. Yes, sir.

Q. When you first came with the White Motor Company, what were your duties? A. In charge of purchasing equipment, manufacturing methods, and time studies.

Q. Is the White Motor Company using the Melling machine now to turn cam shafts? A. Yes, we are.

Q. How long have you been using the Melling machine? A. Since about '26.

(263) Q. 1926? A. Yes.

Q. How many do you now use? A. Two.

Q. Have you been using those two continuously since 1926? A. Yes, sir.

Q. Prior to 1926, what process or method were you using? A. We were grinding.

Q. What machine did you use, in the grinding? A. Landis grinders.

Q. The Landis grinder? A. Yes.

Q. Have you had anything to do, since you have been connected with the White Motor Company, with the cam

shaft department? A. I had charge of the cam shaft department.

* * * * *

(273) Q. (By Mr. Spohn): Now, Mr. Jones, do you know whether or not the White Motor Company is paying, or has paid in the past, any royalties for the use of an invention belonging to another? A. Yes, we have paid a royalty on the grinding of spline shafts.

Q. What was the nature of that machine? A. A form-wheel grinding of the spline, in one operation.

Q. How did that machine compare with the Melling cam lathe, in character? A. It is a machine-tool that is used for the finishing operations, and the parts are different, but the operation and the time are somewhat similar, in the savings effected.

Q. About how long has your company been paying royalties? A. Up until 1935, on the grinder.

Mr. Farley: I object to this as being immaterial and incompetent. I cannot see what bearing it has.

Mr. Spohn: I should have stated to your Honor, the purpose of this testimony is solely on the question of reasonable **(274)** royalties.

Mr. Farley: What bearing could the grinding of spline shafts at the White Motor Company have on machined cam shafts? I do not see the materiality of it at all.

Mr. Spohn: If your Honor please, I think the materiality of it will develop as we go along with this witness.

The Master: I will take the testimony subject to the objection, then, and not rule on it until I hear the rest of it.

Q. (By Mr. Spohn): For about how many years prior to 1935 had you paid royalties? A. About eight years.

Q. How were the royalties based? A. They are based, 10 cents per shaft.

Q. 10 cents per shaft? A. Yes.

Q. And you had been paying that for about 10 years? A. Yes.

The Master: Answer out loud, so that this can be taken down.

Q. (By Mr. Spohn): You made some reference to savings, in referring to the royalty. What did you have in

mind when you said "savings"? A. Savings, on the grinding, are just about 10 cents, in direct labor.

Q. Direct labor savings? A. That is right, dependent on the shaft. It was still half of what it would have cost us. We would have had to perform two operations instead of one, by paying the royalty.

Q. Would you say what it would have cost you in direct labor? **(275)** A. Anywhere from 10 to 16 cents, dependent on the size of the shaft.

Q. Were there any other savings? A. We figured our overhead in as a saving.

Q. About what is your overhead, in the operation? A. About 180 per cent, for that department.

Q. Can you tell us what the total savings are,—that is, including your overhead, as the result of the payment of that royalty, by the use of that machine? A. It would be about 30 or 35 cents.

Q. Do you know whether or not your company had net savings from the use of the Melling cam lathe? A. Yes, we would have the difference such as shown on that time study.

Q. I now show you the time studies, Exhibits AA and BB, and I will ask you if you can state what your savings were, by the use of the Melling cam lathe, in the production of your cam shafts at the White Motor Company? A. The difference between 9.39 and 1.63, which would be about 7¾ minutes.

Q. And, converted into dollars, what does that mean? A. At 90 cents an hour, it would be about 11 cents, probably.

Q. That is, direct labor? A. That is direct labor.

Q. Are there any other savings? A. Yes, the burden.

Q. Considering your labor and your burden together, can you tell us what that saving would be? **(276)** A. It would be about 30 or 35 cents.

Q. Per shaft? A. That is right.

Q. Based on your knowledge of the Melling cam lathe in its operation, and the savings that the White Motor Company effected through the use of those Melling cam lathes, and having knowledge of the invention, do you have an opinion as to what would be a fair and reasonable royalty to pay for the use of the Melling cam lathe? A. I would accept it on that basis that we did on the grinder.

Q. 10 cents a shaft? A. That is right.

Q. Would you say, would you think that would be fair and reasonable? A. Yes, I do.

Q. Under all of the circumstances? A. That is right.

Q. Now, there is in evidence here an agreement between the White Motor Company and the plaintiff, under the terms of which the White Motor Company paid 6 cents a shaft as a royalty. A. That is right.

Q. What have you to say with respect to that 6 cents; did you have anything to do with the determination of it? A. Yes, I jumped at it.

Q. You jumped at it? A. That is right.

Q. And that would be below what your opinion is of the fair and reasonable royalty? **(277)** A. That is right.

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Cross Examination by Mr. Farley.

Q. Mr. Jones, the White Motor Company is, or was a member, and is a member, is it not, of the former Automobile Chamber of Commerce, now the Automobile Manufacturers Association?

Mr. Spohn: Objected to as incompetent, irrelevant and immaterial.

The Master: I will overrule the objection. Answer the question.

A. It was.

Q. (By Mr. Farley): And what was the sum paid by the White Motor Company to the plaintiff, Gordon Form Lathe Company? A. 6 cents per shaft.

Q. What was the total in money? A. I don't know.

Q. You say you jumped at the settlement. Did you have anything to do with deciding whether or not the White Motor Company should pay certain sums to the Gordon Form Lathe Company? A. I decided on the price per operation, from a factory standpoint.

(278) Q. Now, I show you a couple of documents which have been marked Exhibits HH and GG, and I will ask you whether you ever saw those papers before, and whether you are familiar with them, or know anything about the settlement made? A. Our attorneys take care of that. We take care of the details in the factory.

Q. You are not familiar with those papers? A. No, sir, just the operation, and the price we pay per piece.

Q. Exhibit GG shows a payment of $2,455.92 by the White Motor Company to the Gordon Form Lathe Company. Is that in accordance with your recollection of the amount of money that was paid? A. I do not know the amount of money; I only know about the operations, the amount of operations.

Q. Was just one payment made by the White Motor Company to the Gordon Form Lathe Company? A. I don't know.

Q. About what is the annual production of motors by the White Motor Company? A. It varies all of the way from 8,000 to 14,000 per year, plus all service requirements.

Q. Your statement that you considered 6 cents a reasonable and fair royalty to pay is based on the comparison in your mind between the time required for roughing off the excess metal on the cam shafts, by means of the Landis grinder, as compared with the Melling machine? A. The Landis grinder, and what equipment was available at that time.

(279) Q. What equipment was available at the White Motor Company, you mean? A. Or, to go out and purchase or replace the Melling.

Q. You do not know anything about the shapers used by the Ford Motor Company, for machining cam shafts? A. I have seen them.

Q. When did you see them? A. I think I saw them around 1926, on a visit to the plant.

Q. The Ford plant? A. Yes.

Q. Were they in operation at the time? A. There was two of them I think in operation, that I looked at, down the aisle. That is approximately all.

* * * * *

Q. (By the Master): Does your opinion as to the fair royalty to be paid for the use of the Melling machines depend in any way upon the number of cams turned on a shaft? A. It depends upon comparative grinding.

(280) Q. Well, you stated that you thought that 6 cents per shaft was a fair royalty for the Melling machine. Would the fair royalty vary with the number of cams on the shaft to be turned? A. In my opinion it would vary on what we could replace that equipment with, and get the same production, from any type of equipment, and it would

consider the number of cams, together with all of the factors entering into it.

Q. How many cylinders are there in the ordinary White motor? A. We have six, six and twelve; at that time we manufactured a four.

Q. You had an eight-cylinder motor; so you had more cams for a four or a six, and the royalty per cam shaft was higher? A. Compared to grinding?

Q. Your royalty for the improved Melling machine, yes. A. The royalty would depend upon the total costs. I would say, the greater number of cams, the greater savings.

Q. Do you think it is proportional relative to the number of cams, rather than the number of cam shafts? A. No, I would say the number per shaft. The savings would go back into the shaft, compared to the number of cams, and the method you are using, to the new method that you would adopt. It would all revolve around the cost per shaft.

Q. When you stated that a fair royalty was 10 cents per shaft, how many cams did you have in mind per shaft? A. On a six-cylinder, that has twelve cams, of course.

Q. On a four-cylinder, it would have eight? A. Eight cams.

(281) Q. And the royalty should be less than 10 cents per shaft? A. We figure, in our place, a round figure per shaft; and the costs are based upon that basis. The number of cams are an element in the cost per shaft.

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RE-DIRECT EXAMINATION by Mr. Spohn.

Q. Mr. Jones, in the use of the Landis grinder for grinding cam shafts, how many cams do you grind at a time? A. One.

Q. Does it appear that the greater number of cams on the shaft to be ground by the Landis grinder, the greater the cost? A. Yes.

Q. In turning with a Melling turning lathe, they are all turned at once? A. Yes. It does not make any difference.

Q. Now, Mr. Jones, on this Exhibit II, how many cams are on the cam shaft? A. Eight.

Q. And the time studies in evidence, Exhibits AA and BB, were made with reference to this 8-cam cam shaft? A. That is right.

Q. And your savings that you testified to had reference to those time studies? A. That is right.

Q. Upon which you based your opinion as to your royalty? **(282)** A. That is right.

Mr. Spohn: That is all.

Q. (By the Master): Had you heard of the Ford cam shapers prior to the time you saw them in operation at the Ford plant? Were they in operation or not? A. I heard of them indirectly, through a salesman.

Q. Did you ever investigate the relative costs or efficiency of the Ford shaper, as compared with the Landis grinder, to decide whether or not you would use them in your plant? A. Yes. Shaping has almost as much lost time as cutting, I would say. The shaper has that lost time, and I would not consider new equipment.

Q. It has the same lost time as what, did you say? A. Your turning is continuous, and your shaper has the lost time of returning the cut. We eliminate all shapers in our work, wherever we can.

Q. You are thinking of the shaper, as compared with the Melling machine? A. Yes, in hobbing, and manufacturing methods.

Q. When did the salesman try to sell you a shaper? A. He did not try to sell us a shaper. He mentioned it as he was coming through our plant.

Q. Do you recall when that was? A. I do not recall just exactly when it was. That was a special machine at that time, a Ford special.

Q. Were you using the grinder at that time, or was it subsequent to the time? A. We were using the grinder. We investigated the method, of **(283)** getting away from the grinding, from the cost standpoint, and a quality standpoint.

Q. (By Mr. Farley): When was that, Mr. Jones, what year? A. When I first went with White; that was about '25.

Q. (By the Master): The Melling machines were available at that time? A. Yes.

Q. You considered the Gordon Form, as against the Melling machine, or some similar type of machine? A. That is right.

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RE-CROSS EXAMINATION by Mr. Farley.

Q. Just what do you mean by saying you would not consider a shaper because of lost time? You mean because of the return stroke, it does not cut? A. Your return stroke, and your upkeep, and your intermittent cut, for performance.

Q. You do not know anything at all about how long it would take to shape a cam shaft on that shaper, do you? A. We could not go into a special machine, from our standpoint, due to our standpoint. It was not tried out; so that we would not take that chance.

Mr. Farley: Would you read the answer, please?

(The answer was repeated by the reporter.)

Mr. Farley: The answer is "no," isn't it, you do not **(284)** know how long it would take?

A. Not on that shaper.

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(289) MILES G. SLONIKER, called as a witness herein, on behalf of the Plaintiff, first being duly sworn, was examined and testified as follows:

DIRECT EXAMINATION by Mr. Spohn.

Q. Your name is Miles G. Sloniker? A. Right.

Q. What is your age? A. Fifty-five years.

Q. Where do you reside? A. Kenosha, Wisconsin.

Q. What is your occupation? A. Mechanic.

Q. By whom are you employed? A. Nash Motors.

Q. You are here, are you not, pursuant to a subpoena? A. Yes, sir.

Q. When did you become associated with the Nash Motors Company? A. In 1919.

Q. And prior to 1919 with whom were you associated? **(290)** A. The Industrial Controller Company of Milwaukee.

Q. What is their line of business? A. Manufacturing of electrical equipment such as starters and electrical controllers.

Q. Have you been with the Nash Motors Company continuously since 1919? A. Up until '31, then there was a break of time there of about three years that I was in business for myself.

Q. And you went back? A. Then I went back at Nash Motors, and I have been there since that time.

Q. And from 1919 until 1931, what were your duties with the Nash Motor Company? A. I took charge of the crankshaft, cam shaft, connecting rod, and piston lines and retained the title of general foreman.

Q. Were all those lines manufactured by Nash Motors Company? A. All in this one department.

Q. And the Nash Motors Company plant with which you were associated is located where? A. Kenosha.

Q. When you came into the Nash Motors Company in 1919, were they manufacturing cam shafts? **(291)** A. Yes, sir.

Q. What was the nature of these cam shafts, were they for their trucks, or other line of automobiles, or what? A. For the regular line of automobiles.

Q. How many cylinders did that Nash Automobile have? A. Six cylinders.

Q. How many cams on each of those cam shafts? A. Twelve cams, six exhaust and six intake cams on each shaft.

Q. What process did you use for the removing the surplus material from these cam shafts? A. We used at that time a Norton cam grinder with single wheel, one wheel was used on the job, and we ground each individual cam at one time.

Q. You were foreman in that department? A. Yes, sir.

Q. Did you ever see any records concerning the cost of rough grinding those cam shafts? A. I used to get—the costs were sent to me every month; I got my own records every month being general foreman. In fact, I got all overhead costs and everything came direct to my office.

Q. What did you do with those records? A. I used to file the records and keep them until the end of the **(292)** manufacturing year and then we just destroyed them.

Q. Did you look for any of those records before you came here to testify this morning? A. Yes.

Q. Have you been able to find any? A. Not any records whatever.

Q. Do you know what the cost is to grind the cam shafts, rough grind it on the grinder you were using when you first came with the Company? A. Yes, I know.

Q. What was that cost? A. That was set on a piecework basis and we paid $18 a hundred, per hundred shafts.

Q. That would be 18 cents a shaft? A. Yes.

Q. That was direct labor charge? A. That is just a direct labor charge. No overhead was included in this price.

Q. Was that the total cost? A. No, sir; not the total cost.

Q. What other elements entered in there? A. You have your overhead to consider.

(293) Q. Do you remember now what the overhead percentages were as applied in your department? A. Well, the lowest overhead that I can remember was 150%.

Q. How do you figure the cost then of rough grinding the cams, if you take into consideration your overhead? A. Well, including all overhead you would have to, let's see, that would be 27 cents on the overhead.

Q. And your cost would be 27 cents overhead? A. Twenty-seven cents overhead.

Q. And your direct labor charge was 18 cents a shaft? A. Eighteen cents.

Q. And that amounted to 45 cents a shaft? A. Right.

Q. You say you used the Norton grinder in this rough grinding process at that time. Do you know whether or not the grinding wheel expense was included in the over head? A. That was included in the overhead.

Q. Do you know what the Nash Motor Company's experience was with respect to the life of a grinding wheel when you are rough grinding these shafts? A. Yes.

Q. What was that experience? **(294)** A. At that time we used an 18 by 1½ by 5, 360 Norton wheel which cost $7.50.

Q. A wheel? A. A wheel.

Q. And what was the life of one of those wheels while you were grinding it? A. The best that you would get out of that wheel would be 50 cam shafts.

Q. Then that would be 15 cents a wheel? A. Yes, that would be $15 a hundred. The wheel cost would cost us $15 a hundred.

Q. Or 15 cents a shaft? A. Fifteen cents per shaft.

Q. As I understand your testimony, this grinding wheel cost 15 cents per shaft, and was included in your

overhead figure of 27 cents? A. Yes, that is included in the overhead.

* * * * *

(297) Q. When the Nash Motors Company started to use these Melling machines for the purpose of rough turning their cam shafts were all the cams turned at one time? A. Yes, they were.

Q. Do you know the cost of rough turning these cam shafts on the Melling machines? A. I do. I personally set the rate on the job myself.

Q. What was that cost? A. It costs $6 a hundred.

Q. Is that labor cost? A. That was direct labor cost.

Q. And did that include any overhead? A. Not any.

Q. And was there any other element of cost besides your direct labor cost? A. Not outside of the overhead.

(298) Q. And your testimony is that the lowest overhead you ever had in that department was 150%? A. That is right.

Q. Were these cam shafts rough turned on the Melling machine in the same department as they had previously rough ground these shafts? A. Yes.

Q. Now, with your overhead rate of 150% and your direct labor charge of $6 a hundred, can you tell us the cost per shaft of rough turning those shafts on the Melling? A. That would cost you $15 a hundred at that rate, 15 cents per shaft.

* * * * *

(300) Q. Now, your testimony is that your grinding wheel expense of about 15 cents per shaft is included in that 27 cents figure overhead? A. That is right.

Q. Then in view of your answer to that question, do you know why the same overhead percentage to the rough grinding operations you also used in your rough turning operation on the Melling lathe? A. Well, the records were sent to me each month and the total overhead for the whole department was recorded. The overhead wasn't split in units or one certain job, it came through as a part of the department in whole.

Q. That was a departmental overhead? A. That is right.

Q. Assuming that you could break down overhead to apply to each operation on both the rough grinding and

the rough turning of these cams, would the saving on the grinding wheel expense reduce the overhead ratio to be applicable to the turning operation on the Melling machines? **(301)** A. Yes, it would.

Q. Now, would the tendency of the company to allocate overhead on the departmental basis have a tendency to minimize the grinding wheel costs included in the overhead? A. Yes.

Q. Do you remember whether or not overhead figures varied per month, by months, rather? A. Well, your figures always fluctuate, you have a variation from one month to another.

Q. Do you remember the highest overhead figure ever attributed to your department while you had charge of it from 1919 to 1931, inclusive, during the period of time when your department was engaged approximately in normal operations? A. Well, the highest overhead that I can remember was 180%.

Q. (By the Master): Was that during a period of normal operation? A. Well, to a certain extent, yes. Not under a time of redesigning or changing, it was under regular production.

Q. (By Mr. Spohn): Mr. Sloniker, in order to get this straight, you said that your cams had a three-quarter inch face. Do you mean they were three-quarters of an inch wide? A. That is right.

Mr. Spohn: That is right? That is all.

(302) Cross Examination by Mr. Farley.

Q. You testified that the Nash Company got a Melling machine in 1920. Weren't you mistaken about that, weren't you confusing that with the Gordon machine? A. That is right, '25.

Q. That is 1925? A. Yes, I was confused with that.

Q. You testified in the case of Gordon Form Lathe vs. the Walcott Company, didn't you? A. I did.

Q. Deposition taken at Kenosha? A. Yes.

Q. Now, you are familiar with the Gordon machine, are you not? A. I am.

* * * * *

(310) Q. Did you have anything to do with the operation of the Gordon machine in the Nash plant? A. Yes.

Q. Do you remember the experience you had with that machine? A. In what respect?

(311) Q. In so far as the machine's working efficiency was concerned. A. As far as removing stock and cutting the cost it proved to be very satisfactory, but we found it not practical to turn the cam to finish size before rough grinding operation.

Q. When you had the Melling machine the Melling machine took two cuts, a roughing cut and a finishing cut? A. That is correct.

Q. With the Gordon machine, you said it was not practical to cut to the finished grinding size on the Gordon machine. Just what do you mean by that? A. Due to the fact that the tool going over the nose of the cam left small gouge in one side of the cam.

Q. And a hump on the other side? A. No hump.

Q. No hump? A. No hump.

Q. When you used the Gordon machine, what other means did you use for bringing the cam, roughing the cam down to the size your requirements were set to for sending it then for finished grinding? Do you understand the question? A. Yes; rough grinding operation.

Q. When you used the Gordon machine, you used in addition **(312)** to the Gordon machine, some sort of grinder as an intermediate step between the finished grinding and the Gordon machine? A. That is right.

Q. Was this intermediate step substantially the same as the finishing cut that the Melling machines gave? A. Well, you really get a better shape cam off of a turning tool than you do off of a wheel in a rough cut.

Q. When you were using the Gordon machine, for how long a period of time did you use them, do you know? A. Five or six years.

Q. How many grinding machines did you use for rough grinding of the cams after they left the Gordon machine and before they went to the finished grinder? A. Two machines.

Q. Do you remember a man by the name of Hans Luthi? A. Yes.

Q. Mr. Luthi testified that you used three machines for that at the Nash plant. Do you think his recollection is more correct than yours? A. I will tell you. Mr. Luthi was superintendent of various departments and I was di-

rectly in charge. We had three machines but we never used it on that operation because we could take **(313)** care of all the requirements—all the shafts that came off the Gordon machine on two Norton hand grinders.

Q. Before you got the Gordon machine, how many grinders had you used for rough grinding? A. Well—

Q. I think you testified four before. A. I tell you. We had three machines for that operation, but two of them run night and day. See, that is the way the production was handled.

Q. And then after you got the Gordon machines you used two of them? A. Two.

Q. Night and day? A. No. At that time we worked a ten hour day.

Q. Do you have any knowledge at all of a shaper that was used by the Ford Motor Company for roughing cams? A. No.

Q. Do you have any recollection as to the actual costs of finishing the cams by the combined Gordon and grinding method used at Nash? A. After the cam went through the turning machine for the rough grinding operation we paid nine cents per shaft or that would **(314)** be $9 a hundred.

Q. That is for the— A. (Interposing) For the rough grinding.

Q. For the semi-rough grind, you might call it? A. That is right.

Q. What did you pay for the Gordon operator? A. $5 a hundred.

Q. What is your recollection with respect to the number of tool or die makers that you had to keep on repair work on the Gordon machine? A. Our repair bill didn't run so high. That machine would operate one season, a year's time, I would say without repairs. Only just a small minor repair.

Q. Do you have any recollection of the output of shafts per hour that you got off the Melling machines per machine? A. About 16 shafts per hour.

Q. With respect to the questions asked you on direct examination concerning the length of time or difference in the length of time between finishing the shaft on the grinder in accordance with the number of cams that were on the shaft, does it make any difference at all in so far

as the time element is concerned on the Melling machine, assuming that you have two shafts and **(315)** each of the same width of cam face, let's say, each cam shaft, the cams are one inch wide. Does it make any difference in so far as the time element is concerned whether there are 12 cams or 8 cams on the shaft or 16 cams? A. I would say not any.

* * * * *

(318) Q. Now, in view of the experience you had personally with the Gordon machine, would you state whether or not there would be any difference in the functioning of the machine if the nose of the cam were very much sharper than those shown in the nose of the cams on the Nash shaft? A. In regards to the different action we had, really, it didn't show any different on your inlet or exhaust cam so according to that I personally don't think there would be any difference in the shape of the cam.

(319) Q. In the Gordon machine, the tool as it went around the nose of the cam was flopped around through a considerable angle, was it not? A. Yes, it followed the cam on an angle, certain angle.

Q. And whereas in the Melling machine, as the tool went around the nose of the cam it was comparatively slow, wasn't it? A. There is a different method in holding your tool.

Q. I show you a blueprint from the Ford Motor Company, No. A86250, and is attached to certain answers that were filed here and marked Exhibit 2, and I call your attention to the cam outline in the upper part of the drawing, and call your attention to the comparison of that cam outline and the cam outline of the Nash cams. The Ford cam had a very much sharper nose than either of the Nash cams, isn't that true? A. Yes, that is right.

Q. You never attempted on the Gordon machine, did you, to cut any cam shafts having the nose as sharp as the nose on the Ford cams? A. No, I didn't.

Q. When you used both the Gordon and the Walcott machines at the Nash plant, you had, in order to make those lathes turn satisfactory, you had to use a straightening operation on the shaft **(320)** before they were put into the lathes, did you not?

* * * * *

A. I understand. We straighten those shafts.

* * * * *

Mr. Spohn:

(343) Q. As a matter of good grinding practice on grinding these cams, it is good grinding practice to straighten the shaft before you grind it? **(344)** A. To my knowledge, I have worked on many cam shafts in different automobile factories and before a cam shaft goes to the grinding operation or a rough turning operation, the shaft must be straightened.

Q. And it is a fact, is it not, that when the Nash Company was using the Norton grinders, it straightened its shafts before grinding? A. Absolutely.

* * * * *

DEFENDANT'S RECORD.

(5) CHARLES GORDON was thereupon called as a witness on behalf of the plaintiff herein, and having been previously duly sworn, testified further as follows:

CROSS EXAMINATION by Mr. Farley.

Q. Mr. Gordon, you are the same Charles Gordon who testified, not only in the prima facie case before Judge Tuttle, but also in these accounting proceedings? A. Yes, sir.

Q. Now, you are president of the plaintiff, Gordon Form Lathe Company, are you not? **(6)** A. Yes, sir.

Q. How long have you been president, Mr. Gordon? Since the organization of the company? A. I think that I was the first president, and have been president ever since. There might have been a short time right at the beginning that I was not president.

Q. When was the Gordon Form Lathe Company incorporated? A. Well, I don't remember what the dates were.

Q. In the main case there was introduced into evidence as Plaintiff's Exhibit 4-B a document identified as an assignment from the Production Tool Company to the Gordon Form Lathe Company, and included in that was a copy of minutes of the special meeting of the Production Tool Company held on the 5th day of July, 1921, in which the following resolution was offered, and unanimously adopted:

"Resolved, that the actions of Charles Gordon, president of this corporation, and acting on its behalf in the matter of the negotiation with the Willard Machine Tool Company of Cincinnati, Ohio, and Motch & Merryweather Machinery Company of Cleveland, Ohio, be and they are in all things fully ratified, confirmed and approved.

"And, be it further resolved that the officers of this corporation shall, and they hereby are, authorized to execute in the name of this corporation an assignment to the Gordon Form Lathe Company, a corporation, organized and existing under the laws of the state of Ohio."

Does that refresh your recollection? Then, there is also included at page 958, the articles of incorporation of the (7) Gordon Form Lathe Company, dated the 30th of April, 1921? A. I think that is correct. I am not so sure about the month, but I am quite sure about the year.

Q. Then, you have been president since 1921? A. Yes, sir.

Q. The date when the corporation was organized? A. Yes, sir.

Q. And, as president of that company, it has been your duty to supervise the conduct of the business of the company, that is correct, is it not? A. Yes, sir.

Q. And, that included whether or not the company was making or losing money? That is also correct, isn't it? I say, that included supervising knowledge of whether or not the company was making money. A. I would say yes.

Q. Now, in the period from 1921 until 1923, 1924, when the company was making and selling machines, you were the largest individual stockholder of the company, were you not?

* * * * *

(8) A. My memory is that I was not. I might qualify that by saying that I think there were three other stockholders that held an equal amount of stock to what I had. That is my memory at the present time.

Q. (By Mr. Farley): Yes, but the other stockholders were the Motch & Merryweather Company, and the Production Machine Tool Company, isn't that correct? There was a one-third interest between yourself, an individual,

and the other two corporations? **(9)** A. The Production Machine Tool Company owned one-third of the stock of the Gordon Form Lathe Company.

Q. That is right. A. The rest of the stock was owned by individuals. It was not owned by any corporation.

Q. Well, according to the books of your company, the stock subscriptions for the foundation of the company showed the payment of $600 by the Production Machine Tool Company; $600 by the Willard Machine Tool Company; $600 by the Motch & Merryweather Company, and that they had the same interest in the company? A. I think that is correct. But, I don't think that continued after the organization.

Q. Yes. Around about 1924 or thereabouts you personally acquired the interest of the Motch & Merryweather Company, didn't you? A. Well, I don't know what the date was.

Q. But, you did acquire it? A. I did acquire it—not the interest of the Motch & Merryweather Company; it was the interest of—

Q. (Interposing): The individuals? A. Three individuals.

Q. I see. Merryweather, Motch— A. Two Motches.

Q. Two Motches? A. Two Motches and one Merryweather.

Q. And, you have always been vitally interested in whether the Gordon Form Lathe Company was making money or not, haven't you? A. Yes, sir.

Q. At the time you decided to take your machine off the market **(10)** which, as I understood your testimony, was some time in 1924, the Gordon Form Lathe Company at that time had lost about $18,000, had it not? A. I wouldn't be able to give you any information on that at all from memory.

Q. Well, the books of your company that were produced here show that to be the fact. Would you like the opportunity to examine those books and check the correctness of that statement? A. I don't think that would do me any good. I am not a bookkeeper in any sense of the word.

Mr. Farley: Mr. Quaife, do you know where those books are?

The Master: I will bring them in (producing the document above referred to).

Will you read the last question, please?

(The last question was read by the reporter.)

Q. (By Mr. Farley): In the ledger of the Gordon Form Lathe Company, which you produced at the hearings in Milwaukee, on the page which was identified as Exhibit KK, on page marked KK-33, I call your attention to the entries there. The first entry in the left-hand column marked "P" and "L" which is obviously intended to indicate profit and loss, it shows the entry 21, December 31st, a loss of $108.75. That is correct, isn't it (indicating); and for 22, December 31st, P and L, a loss of $10,319.54; and for 23, December 3rd, P and L, $4,343.63; and, for 24, December 3rd, P and L, $3,241.63, and it gives the total underneath that last entry of $18,013.55. That is all correct, as shown by the books there, isn't it, Mr. Gordon? **(11)** A. Of my own knowledge I couldn't say anything about it, because I probably never saw that book until sometime, maybe several years after that was written.

Q. Who did the bookkeeping for you? A. That was done under the supervision or authority, I believe, of Mr. Stanley Motch.

Q. You had a competent bookkeeper; it was your duty, as president, to know that the company had a competent bookkeeper, wasn't it? A. I thought they were. I have no reason to believe otherwise.

Q. And, you have no reason to believe otherwise of the figures contained in the ledger of your own company, have you? A. No, sir.

Q. Mr. Gordon, the Production Machine Tool Company has an interest of one-third in the Gordon Form Lathe Company, hasn't it?

* * * * *

(12) A. Not at the present time.

Q. When did the interest of the Production Machine Tool Company cease? A. Well, I don't remember what the date was. It was two or three or more years ago.

Q. Did you personally acquire any interest in the Production Machine Tool Company at that time?

* * * * *

A. A portion of it. There were other stockholders of the Production Machine Tool Company that took their proportionate share.

Q. What is your present proportion of interest in the Gordon Form Lathe Company as an individual? A. Of the stock of the Gordon Form Lathe Company? I don't remember exactly what it is, but it is 10 and a fraction, if I remember right.

Q. 10 and a fraction percent? A. No, 10 and a fraction shares.

Q. What proportion does that represent of the total? A. That would be 10/18 approximately.

(13) Q. 10/18? A. Yes, sir.

Q. 5/9, then? A. That is the same thing. It always was.

Q. More than half? A. Yes, sir.

Q. Now, as president of the plaintiff company you have claimed through the testimony of your auditor, Mr. Moise, in accordance with his last statement that is filed, that the Ford Motor Company owes you $1,110,686.13; that is correct, isn't it?

Mr. Spohn: Will you read the question back, Mr. Reporter?

(Last question read by reporter.)

A. Well, I can't check on the figures, but I think that it is in that neighborhood.

Q. And if we say for the simplicity of figures that that is $1,000,000 in round numbers, you would get 5/9 of that, considerably over $500,000?

Mr. Spohn: Object to that.

Q. (Continuing): —if your claim here is substantiated? That is your financial interest in the outcome of this case, that is true, isn't it?

* * * * *

(14) A. No, because I don't know about the amount of complications, such as costs. I am speaking of a percentage. That is, 10/18 of the final sum that was obtained, if any, in this litigation. That would be my interest; 10/18. How much that is, or what it is, or the other things that might be involved, that would determine what the amount is, is something that I don't know.

Q. Well, of course, that is just another way of saying that the sum of money you might actually receive possibly might have to be altered somewhat by costs and other expenses, but the fact still remains that that is—the higher the sum paid, the higher your 10/18 will be, the higher sum that the Ford Motor Company would have to pay. A. The greater the amount.

Q. Yes. A. Well, that is natural; 10/18 is the percentage.

* * * * *

(17) Q. (By Mr. Farley, continuing): Did the Gordon Form Lathe Company, Mr. Gordon, make a profit on any of the machines which it sold? A. Yes, sir. Directly on that machine.

Q. All right. Let us limit our question, now, to the cam shaft machines. You are probably keeping in mind crankshaft machines. Limit your answer entirely to cam shaft machines. A. Yes, sir.

Q. You offered to sell the machine to the Ford Company at, I think it was, $4350.00, was it not? A. I don't remember what the price was. I was not selling the machine at the time.

Q. Defendant's Exhibit 54 here shows machinery requisition directed to the Motch & Merryweather Company, showing a price of $4355.00 for a Gordon cam shaft turning lathe, dated 7/15/22. Does that refresh your recollection (indicating)? A. I have no recollection to refresh, because all of the selling was done through the Motch & Merryweather Company, and I was not directly connected with them.

Q. As president of the Gordon Form Lathe Company it was your duty to know at what price the machines were being sold, wasn't it? A. In a general way, yes; not each individual machine.

Q. Now, the books of your company show that, on page 36, your journal entry of May 4, 1923, shows an entry made for Ford, D. E. T. 4355. That checks with the machine requisition which I just showed to you, does it not; which, in addition to the sum of $4355, it shows an entry of $20 for a complete set of circular tools? A. It does.

(18) Q. Now, under the same listings, there is an entry, Willard, $3812.59, that shows the amount of money

you paid to the Willard Machine Tool Company for the work done on that particular machine, does it not? A. I think so.

Q. And, the M. & M. is the next entry, Motch & Merryweather, that has an entry of $653.25? A. Yes, sir.

Q. And, the P. M. T. Co., there is an entry of $435.50? A. Yes, sir.

Q. And those sums total considerably more than the $4355.00, isn't that correct? A. That is correct, and can be explained to a certain extent.

Q. Therefore, there would not have been any profit to the Gordon Form Lathe Company by the sale of that machine had the sale been fully consummated; that is true, isn't it? A. Yes, but that machine was specially built for that particular job, and we figured on absorbing the extra expense due to that.

Q. Now, the sum of $435.50 there, in that entry I just showed you, is exactly 10 per cent of the sales price of the machine, was it not? A. I think it was.

Q. And, you testified on direct examination here that you had received no royalty from any of the machines. Wasn't that payment of 10 per cent a royalty payment to the Production Machine Tool Company, and didn't the Gordon Form Lathe Company pay a royalty of 10 per cent to the Production Machine Tool Company on all of its sales? **(19)** A. I think that is correct. After having testified that we did not receive a royalty, it came to my mind sometime after that that I was mistaken in that.

Q. Then, your testimony— A. (Interrupting): I thought we had that corrected in later testimony. I am not sure, but I thought I did correct that at a later date.

Q. The testimony in that respect, then, was not in accordance with the facts? A. Unless I corrected it at a later date. I think I did.

Q. I might say for your information there was no effort made to correct it. That is the only thing that appears in the record, your statement you made that you received no royalty. That, however, should now be corrected, should it not? A. I would say so; yes, sir.

* * * * *

(45) Q. Very well. Now, let's get to the proposition of the various statements of account which were filed by de-

fendant here in compliance with the order issued by the Master at the request of the plaintiff, and we refer to the first statement of account, and before asking any of the particular questions there, I would like to ask if you remember Mr. Moise's testimony to the effect he was not versed in mechanical matters when he was on the witness stand? A. I believe that he did state something to that effect.

(46) Q. Now, insofar as your case here was concerned, it is a fact, isn't it, that you were consulted about all purely mechanical matters? A. I believe I was.

Q. You have had more actual and practical mechanical and shop experience than Mr. Moise, or any of your counsel, isn't that true? A. I think so.

Q. Was it your suggestion that a Landis grinder be used as a standard of comparison by Mr. Moise in his computations? A. I do not believe it was.

Q. Were you consulted about it? A. I think it was discussed with me and we arrived at that conclusion.

Q. At least you— A. (Interposing): I think I was in on any discussions there might have been about it, and still I would not say that positively either, because there was a lot of discussion probably with the counsel and Mr. Moise that I might not have been in on, that the counsel discussed a great many matters when I was not even in the city.

Q. But at least you approved of it at any rate, did you not? A. I think so, yes.

Q. And as a matter of fact, you knew more, or you certainly have had a wider experience in connection with the use of Landis grinders, for the grinding of camshafts, and other machinery for that purpose, than either Moise or any of your counsel, isn't that true? **(47)** A. I believe I have.

Q. So it would be perfectly natural before making a decision so important as the proper standard of comparison used by the plaintiff in this case, that you would be consulted and your opinion obtained about it, isn't that true? A. Yes, sir.

Q. You testified in the trial before Judge Tuttle, did you not, that you had seen the Ford cam shapers operating in 1915 and also in 1920, do you remember that testimony?

A. Yes, sir, I think it was about that time that I saw those machines in operation.

Q. Now, in selecting the Landis grinder as the standard of comparison, you selected about the most costly method of machining or roughing down the cams of a camshaft, isn't that true? A. No, I would say it was considered the most economical way, it was the most generally used method of doing that work, and—

Q. (Interposing): Do you know of any other method of doing that, outside of using a hammer and chisel and file that would be any more costly than the Landis grinders? A. Why, yes, I do.

Q. And what would that be? A. Why, the milling, the milling was tried and was used by one of your own companies here at tremendous expense.

Q. The Ford Company, you are not referring to the method used by the Ford Company? A. I am referring to the Lincoln Company, I saw them milling cams one at a time, that looked to me like a—

Q. (Interposing): That was before the Lincoln Company was a part **(48)** of the Ford Company, however? A. I do not think so.

Q. When was it you saw the Lincoln Company doing that? A. I don't remember what the date was, but it was after we developed our cam machine, because it was on a visit to them that I saw them performing that operation.

Q. Well, the Landis grinder is certainly a more costly way of machining the cams of a camshaft than the Ford cam shaper, wasn't that true? A. I think it would be, yes, sir.

* * * * *

Q. Are you familiar enough with the operation of the Ford cam shaper to state whether or not it could have been used on the model A or T Fordson tractor camshaft to machine the cams?

The Master: You can answer that yes or no, if you are familiar enough to so state?

A. I believe I am.

Q. (By Mr. Farley): Well, now, will you state, then, whether or not in your opinion that machine could have been used to machine either of those shafts?

Mr. Spohn: Just a minute, if your Honor please. I object to that question as incompetent, irrelevant and immaterial. It is another attempt on behalf of counsel to impeach his own witness. **(49)** I would like to be heard on that point, if I might, your Honor.

The Master: Go ahead.

Mr. Spohn: There was testimony in the principal cause of action here introduced by the defendant to the effect that these cam shapers could not be used to machine either the A or the F shafts. That testimony was not objected to, it was admitted by Judge Tuttle and was, of course, in the record as it went up to the Circuit Court of Appeals. Now, there is only one of two things possible. Either that testimony was relevant or it was not relevant. Of course, I do not assume that the defendant now, who offered that testimony then, could be heard to claim now it was irrelevant, but aside from that, that testimony was in before Judge Tuttle. If it was relevant, it was a part of the case there, and it would seem to me counsel is estopped. If it was not relevant at all, then of course he is bound by the rule of impeachment.

Mr. Farley: The question of the use of the cam shaper was really not before the Court of Appeals at all. There was no issue in the case on the use of the cam shaper.

Mr. Spohn: It is in your brief to the Circuit Court of Appeals.

Mr. Farley: Yes, the purpose of introducing testimony concerning that cam shaper was to overcome the very misleading statement by Mr. Gordon and his expert especially in the Walcott case that prior to the time he made his invention, no one knew how to machine cams by any other way than by the use of the expensive Landis grinders. I think the Court of Appeals **(50)** was very obviously misled in the Walcott case as to the actual facts concerning the machining of camshafts, but having once decided in the Walcott case that the Gordon patent was valid and infringed, obviously the Court of Appeals were not going to reverse themselves, by our showing that camshafts had been machined and millions of them machined by the Ford Motor Company, not only by the use of camshaft

shapers, but by milling machines. The purpose of this was to show that after having used, or attempted to use, the Gordon machine, a reason for buying Walcott machines, we bought Walcott machines. If we had known as much then as we know now, we never would have bought them. They cost us too much money. And, I say, your Honor, that we are in an altogether different phase of the case at the present time. We are now confronted with a claim by the plaintiff here that they should mulct the Ford Company of the sum of over $1,000,000. We are entitled under the laws relating to patent accounting to show the type of machines that we could have used, as standards of comparison. Our Sixth Circuit Court of Appeals has held in this National Tube Company case, I think it is in 12 Federal, 2nd, that the defendant there was entirely within its rights to show to the Court that a prior art machine, which never had been used, could have been modified, and the Court said there was nothing to show that defendant could not, had they known they were going to be charged and held to be an infringer, used the same ingenuity in modifying that machine, which they did as a matter of demonstration to the Master during the accounting. I think we are unquestionably entitled to show that it would have been a matter of very simple design and a **(51)** matter of merely everyday mechanical skill for a man on the job, a mere machinist, to have taken off two tools and machined six of the cams without any difficulty whatsoever.

Mr. Spohn: Your Honor please, if that is counsel's position, it is rather queer it comes up at this late date. On the original trial, Mr. Herklotz testified it was his duty to find new and a better production method. Mr. Herklotz has been in the production game for years, and he was called as an expert witness—

Mr. Farley: He was called as a fact witness.

Mr. Spohn: He was called as a fact witness, but he had charge of that department over at the Ford Motor Company. He testified before Judge Tuttle that that cam shaper could not be used, either on the A or the F shaft, and he demonstrated why. Here was Herklotz, a man who had charge of that department,

and if that matter of pulling out either two or four tools was just such a simple matter, then something was wrong with that testimony at that time.

Mr. Farley: No, not a thing.

Mr. Spohn: Now, if your Honor please, he cannot blow hot and cold on this. That testimony was put in there as a part of the defendant's case on the question of infringement and validity. It went up to the Circuit Court of Appeals on that issue. The Ford cam shaper was referred to and briefed by counsel and stressed up above in the Circuit Court of Appeals, with the attendant uses to which that Ford cam shaper could be put, as related by the testimony of Mr. Herklotz, and the Circuit Court of Appeals made its decision in this matter. It seems to **(52)** me now to turn around and reverse the theory of this case, reverse the theory of that testimony, the theory upon which the case was tried in the prior proceedings, is certainly going a long ways in this matter. It was either relevant, as I say, or it wasn't at that time, and we maintain that counsel cannot maintain now it was not relevant then or material, they offered it. If it was relevant, they are estopped by the mandate of the Circuit Court of Appeals, and if it is irrelevant he cannot change it because of impeachment.

Mr. Farley: I think I said to Mr. Spohn once before that I find it rather difficult to believe he believes some of the things he says himself, but obviously the question here is not the question that was before the Court, and which went to the Court of Appeals. The whole issues before the Court of Appeals were those of validity and infringement. We are now considering the case from an altogether different standard. The defendant hasn't the slightest intention or desire to impeach the testimony of Herklotz. Let the testimony of Herklotz stand. At the time he was testifying he was considering the matter only from the standpoint of what then was before him. The fact of the matter is there was no decision by the Court of Appeals, and you can read that decision from one point to another, which shows that the cam shapers, or any testimony concerning the cam shapers, influenced the decision of the Court in the slightest degree. The cam shaper was not urged

as an anticipation, it was presented in the case, as I said before, merely for the purpose of correcting the misleading nature of the testimony in the Walcott case. During the trial of the case, **(53)** Mr. Gordon was cross examined some about the cam shaper, because the cam shaper did constitute an anticipation, a complete anticipation, as I recall it, of one of the claims, claim 24, which plaintiff refused to urge before the Court of Appeals, and which the Court of Appeals said: "As the plaintiff does not urge these claims, for the reason given in our former opinion, we do not consider them here," and the case was dismissed with respect to those claims, dismissed without prejudice.

I still say, your Honor, obviously it is quite understandable why plaintiff wants to eliminate the cam shaft shaper as much as they possibly can from this accounting, but I know of no rule of law that will forestall a defendant confronted with the situation such as we have here, from making its defenses and making them thoroughly and show what machines might have been used, and show how those machines could have been, by the exercise of ordinary, everyday knowledge of a man skilled in the art, adapted for the purpose of machining the model A or model F camshafts.

Mr. Spohn: If your Honor please, there is a part of these proceedings in the trial below; I am looking for it, I cannot seem to lay my hand on it.

The Master: Why was the specific question asked, in the trial below, as to whether the Ford cam shaper could be used in machining the cams on the model A and tractor camshafts?

Mr. Michael: I think I can answer that. Judge Tuttle was very much concerned over the defendant's attitude in this case toward this patent after the Court of Appeals had held it valid and infringed, and wanted to know why they did not return **(54)** to this shaper, and the Ford Company brought in a string of witnesses, including Herklotz, to prove why they didn't, by explaining that they could not, that it was impossible to use the shaper on the A shaft, which was then practically the entire production of the Ford plant. Now, they turn around and say, "Why, we could have used it." That all came up when there was a question

of whether or not there should be an increase in the question of damages in this case.

The Master: Of course, it is true that the Circuit Court of Appeals held that all questions relating to the accounting should be deferred until the accounting trial.

Mr. Michael: That is right, but can they overlook testimony that was offered below on various questions that were decided pertinent to the accounting. It is only one proceeding.

The Master: In any event, any statements made at that time and in the original trial, even though they were made for the purpose of background and were not directly relevant to the issues in the case, would, I should assume, be entitled to great weight, particularly where they are put in by the same party who may be urging or putting a different interpretation on the evidence in future proceedings, whether or not it absolutely binds the defendant and prevents him from making an inconsistent defense at the present time is something that I am not so certain about. I wonder if it is true, as a general proposition of law, that if you introduce a witness' testimony on a material point, that it is impossible, or you are precluded by the rule against impeaching a witness from introducing testimony by another witness on the same point, which is inconsistent **(55)** with that, if it is independently relevant?

Mr. Spohn: No, I understand that is not the rule, your Honor. That is, I assume if I had an automobile accident and I put a witness on, and the witness went haywire and said the car was going 15 miles an hour, I am not estopped from putting on another witness to prove the fact he was going 25, 30 or 40 miles an hour, because if that were so, every plaintiff or every man in a lawsuit would be subject to the whims and caprices of one witness, and it would knock him out of a lawsuit. That is not so on any material issue. Any party is not bound by the testimony that is produced as to a material fact.

The Master: That is certainly my understanding of the rule.

Mr. Spohn: On the other hand, if it is an immaterial fact, the rule is in Michigan, and elsewhere, it cannot be impeached, of course, that is the general rule, and it is well stated here in Michigan, if it is an immaterial fact.

The Master: You cannot impeach it in the proceeding in which it is immaterial, because it would be just a waste of time to do so.

Mr. Spohn: That is right.

The Master: But the question does become material at this stage, in view of the much greater differential in costs as between the Landis grinder, or the use of the Landis grinder and the plaintiff's machine, and the use of the Ford cam shaper and the plaintiff's machine, as to whether or not the Ford cam shaper could have been used in machining the model A and tractor camshafts. It is certainly a material issue at the present time. **(56)** The only question is as to whether, in view of the previous testimony by Mr. Herklotz, the defendant is precluded from—

Mr. Spohn: (Interposing): See the situation you are in. The case is tried, testimony is taken, it is offered by the defendant without objection, direct testimony, and they are explaining the uses that a machine can be put to, a machine that they claim has defects, on the question of validity and infringement, otherwise they would not put it in, among other reasons, in addition to the reason given by Mr. Michael. That machine is referred to again in the briefs of counsel in the Circuit Court of Appeals, with its uses and functions, as described by the witnesses; that is the way the case goes up to the Circuit Court of Appeals. Can we have one fact before the Circuit Court of Appeals, in the same proceeding, and when the case comes back, have a different version of that fact, a complete reversal.

Mr. Farley: I do not think there will be any complete reversal. In view of Mr. Spohn's reference to the briefs—I do not have the briefs with me.

Mr. Spohn: I have them here.

Mr. Farley: I can check that thoroughly. I know that my own recollection of the reference to the camshaft shaper in the briefs was for an altogether different purpose, and our position with respect to the

camshaft shaper in the case before the Court of Appeals is not to the slightest extent to be reversed here, as I recall the facts.

Mr. Spohn: "A" was Gordon a pioneer * * *" The camshaft shapers were right up to the Circuit Court of Appeals.

(57) Mr. Farley: Sure, on that question, but it is not the question here at all. Our question here is in no way in the slightest degree a reversal of our position there.

The Master: I was just examining the testimony of Mr. Herklotz to try to decide or find out whether the shaper could be used on the Model A and tractor camshaft, was something that was given considerable attention by the Court or counsel, or whether it was simply brought in in an incidental or background way.

Mr. Farley: I know how it was brought in, because we produced Mr. Herklotz, just as Mr. Michael said, Judge Tuttle insisted in going into it, and spent about two days as to why we did not settle this lawsuit, and until we raised the point that that had no proper place in the lawsuit, it continued on, and when we raised the objection concerning evidence of settlement, it not being admissible in evidence, Judge Tuttle admitted it then and dropped the whole thing, but having raised the point and having gone into it, the idea as to why we did not use the camshaft shapers, we put Mr. Herklotz on primarily for testifying concerning the difficulties the Ford Company had with the Gordon machine. He was the man in the plant who knew more about the actual experience, and attempted, more or less supervised the efforts of the Ford Company to make the Gordon machine work. Incidentally, we asked him, merely incidentally, why didn't you use the camshaft shapers on the Model F, and then he gave his testimony about the interference with the bearings, and at one place, I haven't located it, he spoke of the Model T camshaft shaper, and I think he said the shaper, as was **(58)** used on the Model T. Herklotz was considering the actual physical machine as designed and used by the Ford Company on the Model T, not what the Ford Company might have done in 1927

after the shapers had been scrapped some years before, what they might have done had they wanted to use the shaper principle on Model A shafts. I think we are unquestionably entitled to show it.

Mr. Spohn: Did I understand counsel to say that the standard of comparison is a Ford cam shaper, or is it a machine constructed on the principle of the Ford cam shaper, which is it?

Mr. Farley: Both.

Mr. Spohn: Then, if your Honor please, that is an amendment of the pleadings again, at this late date, when plaintiff is through with its case. We now have a different type of standard than we had even in Milwaukee.

The Master: I understand from your statement you assume the Ford cam shapers used on the Model T camshaft could not have been used on the Model A and tractor camshafts without modification.

Mr. Farley: Without some slight modification, true. You would have to take two tools off, a five-minute job for the machinist, that is one way; another way—

The Master: You would also have a more time-consuming process, would you not, in cutting the cams, because you would have the double set of operations you would have to go through.

Mr. Farley: That is true, if you did it that way. Another point is that the actual shaper, as actually built for **(59)** the Model T, could by the attachment, the addition of a very small attachment, be used to cut all of the cams without having an additional operation.

The Master: Well, the comparison of costs as between the use of that machine and the use of the Gordon machine would be somewhat different than a comparison of costs you have made in Exhibits A, B and C.

Mr. Farley: No, it is based on our computation of cost, based on the proposition that we are entitled to show the camshaft shapers by the use of ordinary skill of the machine tool designer, would have been very readily modified to do the A shaft without the exer-

cise of any invention and with just mere everyday machine tool design skill, the type of work the men are doing out there every day.

The Master: Assuming it would not require any novelty of invention to adapt the shapers to the Model A and tractor camshaft, still the manner in which you compute profits or losses in Exhibits A, B and C, was to take the relative times—

Mr. Farley: (Interposing): That is right.

The Master: —of producing cams with the plaintiff's machine and with the shaper.

Mr. Farley: That is right.

The Master: If a modified shaper, such as would be necessary in the tractor and Model A camshaft, would require more time, it would greatly modify the conclusion as to profit or losses.

Mr. Farley: No, your Honor, if you please. Our computations have been made on the basis of that. We take the same **(60)** rate of operation that we reduce the speed, taking into consideration,—reduced the output per hour, taking into consideration—the difference in size of the two shafts, we would compute the machines as working on the same basis, but making allowance for the difference in size.

Now, as a matter of fact, on the re-design of the machine, I am in a position to show by competent witnesses that had we actually gone in to re-design the machine, we could have produced a very much more efficient machine.

Mr. Spohn: If your Honor please, I am somewhat confused by counsel's statement of account. I understood from the statements on file that the standard of comparison, as set up there, was the Ford cam shaper, on the basis of 25 products per hour, and that those, that minute cost was used all the way through. Does that obtain if you withdraw the two tools or four tools, or what have you in mind?

Mr. Farley: Mr. Spohn, I am afraid you are confused, or your recollection is not exactly accurate with respect to our statement of account. We computed for the comparison between Model T shafts machined on the shaper, and as machined on the Walcott machine, a rate of 25 shafts per hour.

Mr. Spohn: That is right.

Mr. Farley: But when it came to the Model A, we used a lower figure of approximately 20 or 21 per hour of those machines.

Mr. Spohn: Yes, but it was based on the 25 of the T production.

Mr. Farley: Surely.

Mr. Spohn: If you have to run it through twice on your **(61)** A production, your 20 or 21 is wrong.

Mr. Farley: We would not have to run it through twice, as I will show by witnesses.

Mr. Spohn: Let me get this straight. There are two you are going to rely on, the number one A Ford cam shaper with some tools withdrawn.

Mr. Farley: No.

Mr. Spohn: Will you state it?

Mr. Farley: We haven't computed it on that basis.

Mr. Spohn: In Milwaukee you did.

Mr. Farley: I asked some questions concerning it.

Mr. Spohn: No, you didn't.

The Master: May I ask this: The statement of account embodied in Exhibits A, B and C, is based upon the use of such a modified cam shaper for the Model A and tractor camshaft, as you are now suggesting as the proper standard of comparison, or was it based on the same type of cam shaper used on the Model T.

Mr. Farley: It is based on the same type shaper, with the small modification that would be necessary.

The Master: Are the modifications taken into consideration in these exhibits?

Mr. Farley: Yes.

The Master: Well, do I understand that with the modified machine—this may be anticipatory, but I would like to find out what your position is, with the modified shaper which would be suitable for the tractor and Model A camshaft, would you have to have two operations to first insert the work piece in one **(62)** way, and then turn it around.

Mr. Farley: No, not with the machines upon which we based our computations.

Mr. Spohn: If your Honor please, may I have just a short recess until I check the Milwaukee proceedings?

The Master: Yes.

Mr. Spohn: Before anything further is done in this matter.

Mr. Farley: I can hasten you along with that.

Mr. Spohn: I would rather have my own observation for the time being.

The Master: We will take a recess until two o'clock.

(Thereupon, a recess was taken until 2 o'clock p. m.)

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(63) Detroit, Michigan,
Monday, January 16, 1939,
2 o'clock p. m.

The hearing was resumed pursuant to recess.

CHARLES GORDON was thereupon recalled as a witness on his own behalf as Plaintiff, and having been previously duly sworn, testified further as follows:

CROSS EXAMINATION by Mr. Farley (Continued).

Mr. Spohn: If your Honor please, just before lunch I called your attention to the fact I would like to check the Milwaukee proceedings, and I have checked the testimony taken at Milwaukee, and I am reading from page 337.

Mr. Farley is speaking, and he says this:

"Our point here, in view of the statements of Mr. Spohn that we are misleading the plaintiff, we pointed to the testimony of Mr. Martin and Mr. Wibel, as illustrating the principle of these shapers, principle of operation of these shapers. I can't conceive of any court preventing a defendant in a case such as this from showing that just simple, ordinary mechanical skill—and that is all that is necessary to have used that Model T shaper on the Model A camshafts. Our point right here is that in the first

place we could have used two shapers. We could have taken four tools out of that shaper, all with a monkey wrench, four tools and the machine could have gone on operating without anything, without any other change, excepting taking those tools off, and we could have shaped the cams in two operations on the **(64)** shaper. That is, using two shapers, one shaper to operate one of them—it has got four cams —and taking the tool, the things from the other machine, and cut the other four cams, and my point is this: I might say it right now, because I am going to urge it later, that if plaintiff had really wanted to be perfectly fair in making a standard of comparison, they would have made that standard instead of going to the Landis grinders. It would have made an altogether different situation with respect to their so-called profits."

Mr. Spohn: If your Honor please, I would like to have counsel state again on the record with respect to these Ford cam shapers, what their standard is. Plaintiff has about finished its case and it has relied on these accounts they have filed. It has relied upon the statement filed by the defendant in those accounts, both as to the costs on the shaper operations and their references in their account to the testimony in the principal case and the exhibits of the original Ford shaper.

I would like to have counsel state now what his position is so that we may be informed with respect to these shapers and their use as a standard of comparison.

Mr. Farley: Our position simply is that so far as the shaper is concerned, it is our intention to show it to the Court, that taking the regular design of that type of machine, it would be a matter of but simple, ordinary, everyday skill of a man skilled in the art to make the necessary modifications to those machines to enable them to function perfectly satisfactorily and efficiently on the Model A shafts or the Model F **(65)** shafts. That is one phase of it. We used that particular phase in our computations and our standards of comparisons and accounts we filed.

The Master: In the accounts that you filed, were you using as a standard of comparison the modified shaper you have in mind?

Mr. Farley: Yes, the modified shaper I have in mind, exactly. That is what we use, one standard of comparison.

The Master: Is it your contention it would have taken no more time to have operated such a shaper?

Mr. Farley: We made allowances in our computation for the difference in size of the two shafts.

The Master: Did you make an allowance for a difference in principle between the shapers?

Mr. Farley: There would be no difference in principle, if your Honor please. The machines would operate on precisely the same principle.

The Master: Well, from this statement that Mr. Spohn just read into the record—

Mr. Farley: That is another angle, if your Honor please.

The Master: Go ahead.

Mr. Farley: The point is there, and we have not as yet submitted any computation on that basis. It was my intention, however, to submit one as a further standard. In other words, we might say that is another string to our bow, but taking the Ford shapers as actually manufactured for the machining of the Model T camshafts, there would be absolutely no change required in the machine, except to have a machinist take a monkey wrench or other wrench, and remove a part of the tools and to use two (66) shapers.

Now, we have not used that, or we did not use that in the statements of account which we filed in response to the orders which you had issued, and I might say that our reason for not doing that was this:

Under the authorities the standard of comparison, and the defendant is entitled to use as his standard of comparison, the best known available means, we used the best known available means, because the knowledge to slightly modify those camshaft shapers was within the province of any skilled designer at the time, at the beginning of the infringing period, and we have used that because it is the best known available means.

However, if it should eventually be held by the Court that the slight modifications that would have been required to have those shapers working under identically the same principle, slightly modified to perform the operation of machining the Model A or Model F Fordson camshafts, should the Court decide that it was not within the province of a skilled mechanic or a skilled designer to make that modification, and that we are not entitled to use that as our standard of comparison, then I say we are entitled to put in this other standard of comparison, the use of two shapers, which, frankly, would not be as favorable, because it is not the best available means, and it is my purpose later on to show that, and perhaps put in a computation on that.

In that connection I might state that so far we have filed statements of account in pursuance of your orders.

We have, however, just started our case and I think we are entitled to show in our case anything that may be pertinent to **(67)** this whole subject matter, even though we do insert as an alternative standard of comparison still another form of comparison which we have not as yet made in the computation.

Mr. Spohn: If your Honor please, I don't want any dispute later as to what this situation is with respect to this standard of comparison. I think I understand counsel, but if I mis-state I wish he would tell me so that we have no dispute.

I understand your account is filed and computations are related to the Ford cam shaper?

Mr. Farley: That is right.

Mr. Spohn: And the computations which are made upon a Ford cam shaper, there have been some as yet undisclosed modifications which have been made or would have been made?

Mr. Farley: That is right.

Mr. Spohn: That is your position?

Mr. Farley: That is right.

Mr. Spohn: And now, then, as an alternative position, your position is that the Milwaukee position that you could have withdrawn four tools—

Mr. Farley: That is right.

Mr. Spohn: And the computation on that you have not as yet; it is in none of your accounting records?

Mr. Farley: That is right.

Mr. Spohn: Now, then, I want to read to you paragraph 25 of the statement of account, and the questions.

"Q. Point out and describe the method, step by step, and the means employed by the defendant immediately prior to the adoption and use of said infringing machines for reducing to **(68)** finished sizes the rough forged cams of automobile camshafts."

And the answer is:

"A. A step by step description of the method and means employed by the defendant, immediately prior to the adoption and use of the infringing machines, for reducing rough forged cams of automobile camshafts to finished sizes is set forth in the testimony of P. H. Martin and Elbert M. Wibel, taken at the trial of this cause, and reference is made thereto, particularly to that part of such testimony found on pages 204 and 205 and 215 to 277 of the printed record on appeal—"

The Master: Isn't that 275 to 277?

Mr. Farley: I think it should be. It is a typographical error.

Mr. Spohn: (Reading):

"—to 277 of the printed record on appeal of the within cause, and Exhibits 53, 53-B, 61, 62 and 63, supporting such testimony and statements of account filed."

And the answer to the question 2-A of Exhibit C, defendant's further statement of account, wherein you state as follows: 2-B that is, instead of 2-A.

"In preparing its Schedule 2 defendant has computed the cost of machining the cams of Model A-6250 camshafts on Ford cam shapers of the type regularly used by the defendant in its plant for machining Model T-410 camshafts,"

and 2-C, same Exhibit C, being the defendant's further statement of account:

> "In preparing its schedule defendant has relied upon the cost of the use of the cam shaper computed from established **(69)** comparative costs of the use of these shapers on Model T-410 shaft, and Model A-6250 shafts as a standard of comparison, and also the comparative costs on the Westinghouse,"

which I won't read.

In the answer to those questions, you used, did you not, or you intended to set forth and estimate, I understand you claim that you were using Ford cam shapers of the type regularly used by the defendant in its plant for machining Model T-410 camshafts.

Mr. Farley: Yes, yes. The point there, of course, is and that is a question eventually for the Court to decide,—I notice I say Ford cam shapers of the type regularly used. Now, the question is whether type regularly used limits a defendant to that identical, physical structure, or whether we are not under the authorities in a position to show that the machines that we propose to introduce testimony about, are still machines of that type, slightly modified to compensate for the differences in the dimensions of the shaft. I still think that does not preclude us from showing our position there.

The Master: Is there any indication, definite indication, anywhere in this statement of account, in either Exhibits A, B, or C, that for the Model A and the tractor camshafts you were considering a modified shaper, instead of the actual or identical shaper to that used in the Model T.

Mr. Spohn: There is not any language like that.

The Master: At the time you were preparing these statements of account you did not happen—it did not occur to you or the parties who prepared them that Mr. Herklotz had testified there would have to be a modification?

(70) Mr. Farley: No. As a matter of fact, we had that fully in mind, your Honor. I am sure that counsel for plaintiff, at least I gained the impression, that they

felt they were throwing a bombshell at us when they pointed to Herklotz' testimony.

I was fully cognizant of that testimony, and we had carefully checked the whole situation.

Our own feeling of Herklotz' testimony, I might say, your Honor, that I intend producing Mr. Herklotz here as a witness in this proceeding. We are not attempting to impeach his testimony in the slightest degree. Our position is that when Herklotz was testifying, that he had in mind, as he very frankly says, the physical machine that had been used by the Ford Company for machining the Model T's.

The Master: In order to further ascertain your position here, will it also be your claim that in addition to modifying the machine for machining the cams and camshafts, you could also have modified the camshaft itself?

Mr. Farley: I intend to show that by one of my witnesses, yes, your Honor. That would have been even simpler. I intend to show that, and if we had slightly modified the design, cut a quarter of an inch off one end of the bearings, which would not have affected the operation of the car in the slightest degree, that we could have used the camshaft shapers as they were, without any modification.

The Master: I can see various difficulties of the defense you are raising, or various questions that would have to be answered. For example, one very important question is why, if that could be done so easily, it was not actually done after the (71) Circuit Court of Appeals handed down its decision in the case against the Walcott Company.

Mr. Farley: I intend to explain that by my witnesses, if your Honor please.

The Master: There was a great deal of discussion throughout the trial of the case before Judge Tuttle as to whether or not the defendant had been guilty of deliberate infringement within the meaning of the statute subsequent to the handing down of the Circuit Court of Appeals' decision, and I think there are several places where Judge Tuttle was taking up the various alternatives which faced the defendant at the time that decision came down.

He considered that it would have been impractical to have scrapped the machines and gone back to the grinder, and I didn't see any statement made by any other witnesses or by defendant's counsel at that time that it would have been a simple matter to have gone back to the shapers, or to have shapers rather than the other.

Mr. Farley: The simple explanation of it, if your Honor please, and I intend to show that by witnesses, we have already had the Walcott machines running in the plant. The shapers were a special machine.

In the first place, they were a machine that was designed in the first instance by the Ford Motor Company. To have started to rebuild those machines would have taken just as long as it would have to produce the Pioch machines.

Within four months of the time that the decision was made, when it was finally—the conclusion was finally reached that the **(72)** modified type of head which the Walcott Company was offering was too much like the original head, and that if the original head was an infringement, this modified type of head might also be held to be an infringement. Then the decision was reached to build a new machine, and the reason why the Pioch machine was built, the milling machine, was because as long as the company was confronted with the proposition of having to make some special machines, as long as they were confronted with that proposition, they decided to build a machine which they felt sure would give them an even greater production, much greater production than they could possibly hope to get, either on the shaper or the Walcott machine, and the facts show that is exactly what happened. They put the Pioch machine in and it had more than twice the production of the Walcott machines and more than twice the production of the shapers. We could have gone to the shapers, but the Pioch machine was eventually held to be non-infringing.

The Master: You didn't know at that time you were going to be able to invent a machine like the Pioch.

Mr. Farley: They knew that just as certainly as they know they are going to turn out one thousand cars tomorrow or five thousand or how many they know. It is a matter of everyday machine design. Three or four men design machines every day that these Pioch machines are child's play beside.

Mr. Spohn: I am particularly glad counsel made the statement he did with respect to the reason why the Ford Motor Company, the defendant here, elected to use the infringing machine while they were developing the Pioch machine, and that **(73)** was that they wanted to develop a machine that would give them a great big production.

In other words, they are going to use our property right, knowing that they have no right to use that, and they did that a year or better and did it solely for one reason, and that was to give them the time to develop another machine which would cut down their costs.

The Master: On the evidential question that has been raised, I will make this ruling. I think it would be very bad policy not to, so far as possible, to get into evidence at the present time all matters which may be material, or where there is a good question of their being material to the accounting, even were I myself of the opinion that they were not relevant.

It is certainly common practice in equity cases to allow a great deal of latitude in introducing testimony, and to allow testimony to go into the record so that if the Appellate Court has a different viewpoint on the evidential question than the lower court, it won't be necessary to send it back for new trial or further proceedings, but they can wind up the proceedings at that time.

I noticed in the new Federal Rules of Procedure, Rule 43, that principle is definitely stated, and for that reason I will allow the defendant to continue with this, or to undertake this line of inquiry without making any decision at the present time to the legal significance to be given to the evidence introduced.

Mr. Spohn: Before the question is read by the reporter, we entered into a stipulation, did we not, that

at the time of trial (74) that exceptions were to be noted without further statements or oral objection?

The Master: That is right.

Mr. Spohn: If your Honor please, I want to object further to the question on the grounds it is improper cross examination. There is nothing in the plaintiff's case upon the use of the shapers as any standard of comparison at all, and it is my understanding if Mr. Gordon is called for cross examination with respect to such evidence as he has presented on the trial, he can only be examined as to that.

Mr. Farley: I might say, in view of that, if your Honor please, that we have here a substitute statement of account filed by the plaintiffs in which they have selected a certain standard of comparison. They have had the testimony of Mr. Moise on direct examination and I purposely developed it before asking this question of Mr. Gordon; that he is the man most versed on the plaintiff's own side of the case in mechanical matters. Mr. Moise disclaimed any knowledge or but very little knowledge of mechanical matters. This witness being the president of the plaintiff company, and plaintiff having filed its standard of account, I think we are entitled to examine into their statement of account setting up certain standards of comparison. I think we are entitled to examine into the standards of comparison available.

Mr. Spohn: We set up the Landis grinder on the A and F and Ford cam shaper on the T, as standards of comparison. There is no objection at all to counsel dwelling at length on cross examination on the standards that were used, but on cross examination (75) to interject some other type of standard, the discussion of which today has ranged from the Ford cam shaper up to two other types of standards, it seems to me is going pretty far afield on cross examination, even assuming the liberality that usually attaches to cross examination.

The Master: We are still restricted in the Federal courts to cross examination only to matters brought out in the direct examination, and while I think that this line of inquiry is sufficiently relevant

to the issues in the accounting proceeding so that the question itself is competent, I don't recall that Mr. Gordon himself has testified upon direct examination upon whether he chose the Landis grinder as a standard of comparison, or why he considered that in consultations with his counsel, that the Landis grinder was the proper comparison. I am inclined to think this is outside the scope of direct examination. Whether any inference could be drawn from the failure of plaintiff's counsel to put Mr. Gordon on the stand and have him testify on that, I don't know. I don't think you can examine on that unless it was covered on direct examination.

Mr. Farley: Oh, the point isn't of very great importance, anyhow, and I think I will resume a different examination of Mr. Gordon at present.

Q. (By Mr. Farley): You have already testified here, Mr. Gordon, that your machine, your Gordon machine, was unsatisfactory at the Ford plant, haven't you? A. Yes, sir.

Q. Now, you had a similar experience with your machine in the plant of the International Harvester Company, did you not?

(76) Mr. Spohn: I object to that as incompetent, irrelevant and immaterial.

The Master: Objection overruled. It is relevant to the question of special damages which has been raised by the plaintiff.

A. I hadn't anything whatever to do with the machine that went to the International Harvester Company, other than to know that one was sent there, and, of course, my business there was not restricted to the cam machines, and I was very busy on other things, and finally I started an inquiry as to what happened to those machines, or that one. I don't remember whether there was more than one machine.

Q. Didn't you, as a matter of fact, go to the plant of the International Harvester Company to assist them in their difficulties, the same as you did at the Ford plant? A. I did not.

Q. You did not? A. No, sir.

Q. And then, do I understand it to be your testimony that even though you were president of the Gordon Form Lathe Company, you don't know whether the International Harvester Company had difficulties with your machine or not? A. I heard that they did, and I made inquiry, but I didn't get any satisfaction.

Q. You are not in a position to say that the International Harvester Company was ever able to use your machine any more satisfactorily than the Ford Company were, are you? A. No, sir; I am not. I am uncertain about anything that was done **(77)** with our machine in that plant.

Q. Now, the truth of the matter is with respect to the machine at the Ford plant that that machine was in there except for a hiatus when it was sent back to be overhauled, from December of 1923, until some time in 1924, isn't that true? A. I believe that is true.

Q. And after the machine had been overhauled and sent back to the Ford Company, you yourself were there for a period of some three weeks in attempting to make it work, that is true, too, isn't it? A. Yes, sir.

Q. And you testified before Judge Tuttle that you spent a good part of every day in the Ford plant working in and around that machine; sometimes you would be there six hours and sometimes seven and sometimes eight hours, that is true, too, isn't it? A. I think it is, yes, sir.

Q. Now, did you have anything to do with certain denials that were read off by Mr. Spohn at the beginning of the hearings on July 18th here of the various facts and statements made in the defendant's statement of account? Were you consulted as to whether or not those things should be denied or not? A. I don't know what you are talking about.

Q. Well, were you consulted about any of the denials of the statements made by defendants in their statement of account?

Mr. Spohn: Do you understand the question about what denials mean?

A. No, I don't.

The Master: Do you recall that Mr. Spohn at one time in **(78)** the course of the hearings read into the

record a list of denials of the answers of the defendant in the three exhibits. Exhibits A, B and C, embodying the defendant's statement of account? He went through it paragraph by paragraph, and stated where the plaintiff admitted or denied the statement made by the defendant.

A. Well, I don't remember.

The Master: Did you have anything to do with that?

A. I don't think I did. I don't remember.

Q. (By Mr. Farley): Perhaps it might refresh your recollection if I read directly from the record. "Mr. Spohn—," this is page 29 of the proceedings of Monday, July 18, 1938.

"Mr. Spohn: Now, if your Honor please, as Mr. Watts has pointed out, the statements of account filed by the defendant in this case under the rule are pleadings. There are three statements of account and they have been designated for purposes of identification for cross examination as Exhibits A, B, and C, Exhibit A being the first statement of account and Exhibit B being an amended statement of account, and Exhibit C being defendant's further statement of account. These statements of account, as I say, are pleadings. Plaintiff admits some of the facts therein stated and denies others, and, of course, as to those denied, puts defendant to its proof, and it is my purpose now to advise the Court and counsel for the defendant what portions of these three accounts are admitted by the plaintiff, and what portions of these accounts are denied, and when I say admitted, may that be understood as accepted by the plaintiff, and when I say denied, may it be understood as meaning rejected by the **(79)** plaintiff, and I am going to go through those slowly. There are 53 questions involved in the first account, the answers to which, in some instances, were amended in the amended account."

And then Mr. Spohn started enumerating them and said question number one was admitted.

Then he goes through, for example, question number four, the answer is denied. Question number twelve the

plaintiff denies. I will skip along. And question number thirty-five plaintiff admits the answer, except the following portions of the answer which plaintiff denies: (a) A Gordon lathe as disclosed in Plaintiff's Exhibit 2, patent number 1,542,803 to Charles Gordon and Alfred W. Redlin.

Question No. 36 plaintiff denies. Questions Nos. 37, 38, 40, 41, 42, 43, plaintiff denies the answer.

Well, now, in that list of 53 answers which we filed, quite a few of them were denied. Now, my question is, were you consulted by Mr. Spohn concerning the denial of any of those answers which we made? A. It might be that I was in on a discussion of it, but I don't remember any direct work that I did in reference to that.

Q. Well, now, let us refer to question 35 or answers 35 to 43 inclusive, 45, 44, inclusive, all of which were denied by your counsel. Every one of those questions has to do with the operation of the Gordon machine in the plant of the Ford Motor Company. Now, you are the only person connected with the plaintiff who had knowledge of the operation of that machine at the Ford Motor Company, isn't that true? **(80)** A. A different man was with the machine at the time it was at the Ford Motor Car Company. The second time I think I was the only one.

Q. The question is, Mr. Gordon, you are the only one connected with the plaintiff at the present time who had direct personal knowledge of the operation of that machine at the Ford Motor Car Company, and the answer is yes, sir? A. I would say yes.

Q. Now, in your testimony before Judge Tuttle here, if my memory serves me right, you claimed that your machine worked very efficiently at the Ford Company, or at least I got that impression from your testimony, is that true or not? A. Well, I stated in my testimony, I believe, that we had trouble with one of the rolls. I also stated that a great deal of my time was used in trying to get the shafts to be turned in a condition in which they should be before being put into the machine for that operation.

Q. As I recall it, you testified generally that at one time you turned several hundred shafts through that machine. Is that your present recollection, several hundred shafts were machined at the Ford plant by your machine? A. Not at one stretch, I don't believe.

Q. Well, those shafts on which the machine was used were the Fordson F-446 shafts? A. Yes, sir.

Q. Very well. Now, I am going to read to you this answer 35. It is in answer to question 35: "Point out and describe the method," is the question propounded to us. "Point out and **(81)** describe the method step by step and means employed by the defendant immediately prior to the adoption and use of the infringing machines for reducing to finished sizes the rough forged cams of tractor camshafts."

In answer we state:

> "The method and means employed by defendant immediately prior to the adoption and use of the infringing machines for reducing to finished sizes their rough forged cams of tractor camshafts were:
>
> "(1) A roughing finish performed by
>
> (a) A Gordon lathe as disclosed in Plaintiff's Exhibit 2, patent No. 1,542,803, to Charles Gordon and Alfred W. Redlin—"

Your counsel denied the truth of that. Isn't it true that the Gordon machine was used to rough finish the cams of tractor camshafts at the Ford plant prior to the adoption of the infringing machines? A. Yes, sir; we had one machine in there and you also had a lot of grinders set up for the same operation which could be used.

Q. Yes, and which we also set up in answer to that question. So then your counsel were in error in denying the truth of that statement?

The Master: Which number was the question?
Mr. Farley: That is 35, if your Honor please.
The Master: You didn't get an answer.

A. I wouldn't know just how to answer that, because I don't know all of the circumstances.

Q. Well, the circumstances merely are this. We stated they used **(82)** a Gordon machine in answer to the question, for turning the rough forged cams of tractor camshafts. And your counsel here stated, denied the truth of that. Now, as a matter of fact, the Ford Company did use a Gordon machine for that purpose? A. They used the Gordon machine. They also used the grinders.

Q. Just a minute now. A. Let me explain the situation as I see it. We had a machine in there and that machine was not used for continuous production, whereas you did use for continuous production the grinders. Now, it is pretty hard for me to say whether they were mistaken or not, dependent upon their understanding.

Q. Well, it is a fact that in stating that, as we did, that we used a Gordon machine for rough finishing the rough forged cams of tractor camshafts, we stated the truth, didn't we? A. I think you did use it there for a small number of cams, but it was not regularly in use.

Q. Therefore, your counsel's denial of that should be retracted, should it not?

The Master: I notice, before answering, I notice in paragraph 35, first part, roughing finish performed by (a) a Gordon lathe and (b) a rough grinding operation in which the excess material is removed by means of a Landis grinder. I suppose that if you take that literally, it might be interpreted to mean that both the Gordon lathe and the grinder were used.

Mr. Farley: I don't think counsel for the plaintiff, if your Honor please, was misled by that, because they admitted all of the answer excepting the paragraph which refers to the Gordon lathe.

(83) A. Well, I don't think they were mistaken if they stated that they didn't use it, having in mind that it was not used for regular production.

Mr. Spohn: I made the statement. May I be permitted to say what I had in mind when I made the statement?

The Master: It is up to counsel.

Mr. Spohn: I don't care whether I do or don't.

Mr. Farley: It doesn't make a particle of difference to me.

Mr. Spohn: If your Honor please, we knew the Gordon machine was there. We understood it was there as a demonstrator they were trying to use for the purposes for which it was not bought as yet and never was in fact bought. I had understood that question to mean and the answer to the question to mean regularly used in the regular line of production.

We were looking here for facts and figures upon which to base an accounting for profits on an infringing or other machine they used. That is the purpose of all those questions. It is idle to say we didn't know the Gordon machine was there, or we attempted to deny its existence at the Ford plant, except as it was used regularly in the line of production. It is immaterial to this accounting from a profit standpoint.

Mr. Farley: Well, it is very material to the accounting. Of course, I might say that it is my purpose now to go over these other statements made here in the answers which plaintiff has denied. I think the burden is very clearly on us in view of the statements of account which we filed and which are denied, to show the correctness of those statements. That is, the burden **(84)** is now placed upon us to prove that the statements which we made were made bona fide in perfectly good faith, because of certain statements made by Mr. Spohn that in view of the statements of account which we had filed, they were going to make some sort of a claim which I personally consider extravagant, for punitive damages being assessed. We might shorten this. If counsel for plaintiff is willing to change his denial of all of the paragraphs relating to the Gordon machine to admissions.

Mr. Spohn: Oh, no, no. We will admit, of course, that the Gordon machine was in the Ford plant.

Mr. Farley: And that is as far as you go?

Mr. Spohn: And that it was used in the Ford plant, we will admit that, of course. The denial was that its use had any relation to these accounting proceedings, so far as plaintiff's case for profits.

Mr. Farley: I am going to show it will have a lot to do with it.

Mr. Spohn: Okay.

Mr. Farley: Very well.

Q. (By Mr. Farley): Now, then, the Gordon lathe, Mr. Gordon, which was used at the Ford plant, the answer to question 36 states is shown and described in the Gordon and Redlin patent, Plaintiff's Exhibit 2, and its intended mode of operation is described therein. Wouldn't you say that is perfectly correct, that the Gordon lathe which you

used at the Ford plant was a machine such as shown in your patent and described, and its intended mode of operation described therein? A. I would say it was practically the same, followed the patent (85) specifications.

Q. So the first sentence of answer 36 is a truthful statement of fact, then, is it not? I just read it to you. The first sentence of the answer 36.

Mr. Spohn: Yes.

Q. The particular type, the next sentence is, or character of shaft, or shafts, it was used on by the defendant, was the shaft of the Fordson tractor, designated as Model F, and the shaft is shown in drawing F-446, blueprint of which is furnished herewith in connection with answer No. 7, as Exhibit No. 3.

Now, is that a truthful statement of fact, Mr. Gordon, and I will show you Exhibit No. 3, shaft of the Fordson tractor. A. The question was is this a drawing?

Q. Yes. You may read, if you care to, the text here that I was reading from, the second sentence. That was what I just read to you. A. I would say that that is a correct—

Q. (Interposing): That is a correct statement of fact? A. I think so.

Q. Very well. That text of the second sentence there. Now, the mode of operation, our answer goes on, the mode of operation of the Gordon machine in cutting the F-446 camshaft was that of mounting the shaft which had previously been centered between the centers 11 and 20.

Now, the Ford F-446 camshafts were previously centered before they were sent to your machine, were they not, and they were mounted between the centers 11 and 20 shown in your patent? I might give you a copy of the—you might for the rest of this (86) consult this Gordon-Redlin patent which was introduced in evidence as Plaintiff's Exhibit No. 2, and which is contained in Volume 3, the book of exhibits, from pages 962 to 976, inclusive. Now, the question was, reading this again, the mode of operation of the Gordon machine in cutting the F-446 camshaft was that of mounting the shaft which had previously been centered between the centers 11 and 20, and the centers 11 and 20 are shown in Fig. 1 of the drawing, I am pretty sure. Here is 20. A. There is 20. I don't see 11.

Q. 11 is probably referred to in the text of the patent. I call your attention now to— A. (Interrupting): Here it is, 11. Yes.

Q. 11, then, is shown in Fig. 9, and for clarity of the record the text in the patent in the second column of page one refers, beginning line 91, "at the other end of the spindle 9 as provided with cone pointed center 11," and on the first column of page two in the second paragraph, line 13, it refers to "the cone pointed center 20." So then, so far, that statement is correct, isn't it, that in the use of the Gordon machine at the Ford Company, you mounted the shaft which had previously been centered between centers 11 and 20, that is correct, isn't it? A. Only that the center bearing was supposed to be turned prior to that operation also.

Q. Yes. And the description goes on:

> "And clamping the end of the camshaft adjacent to the center 11 in the split collar by means of a clamping bolt as shown in Figs. 9 and 10 of the Gordon patent."

That also correctly describes the machine you had at the (87) Ford Company, doesn't it? A. I am quite sure, excepting in regard to the split. I don't know whether the driver was a split driver or not. Sometimes we use a split driver and sometimes a solid driver, but it is very immaterial, I would judge. No, I wouldn't say it was untrue.

Q. "The work being rotated in the lathe, the cutting tools 37, one for each of the eight cams to be turned, were oscillated upon an arc having a radius, the center of which coincided with the axis of the shaft 24, shown in Figs. 6 and 7 of the Gordon patent."

That is how the machine was operated and used at the Ford plant, wasn't it? A. I didn't follow it very well, because I was trying to find what you were reading.

Q. I was reading the last sentence on page 12:

> "The work being rotated in the lathe, the cutting tools 37."

And so forth, and I stopped my quotation, "as shown in Figs. 6 and 7 of the Gordon patent."

The sentence continues, Mr. Gordon:

> "This movement of the tool serving to move the point of the tool to and from the axis of rotation of the camshaft being turned."

A. I think there was something in error here. I am trying to find the numbers. It says here, "were oscillated upon an arc having a radius, the center of which coincided with the axis of the shaft 24." Where is the shaft 24?

(88) Q. Here the tools were oscillated back and forth, to and from the center of the shaft? A. That is correct. I was thinking that you were referring to the tool—

Q. (Interposing): Tilting? A. Yes, the tool tilting, but you mean the entire tool-carrying arm?

Q. Yes. A. That is what you are referring to. Yes.

Q. Continuing on the next page:

"This movement of the tool serving to move the point of the tool to and from the axis of rotation—"

A. That I would say was correct.

Q. Next sentence:

"Of the camshaft being turned. As the camshafts were rotated, the tools 37 were given a further oscillation about their cutting points as a center by the action of a cam 44 transmitted through a bell crank lever 52 through gear sector 54 to the gear to the tooth portion of a tool holder 34 in which the tool 37 was secured."

Isn't that also an accurate statement, truthful statement of the operation of the defendant machine at the Ford plant? A. I don't find this 54 on here. Oh, yes. You have got two numbers on the same piece. This bell crank 52 and to the end 54.

Q. 54 refers to the gear sector? A. That is correct.

Q. And your answer, then, to that question is yes? A. Yes, sir.

Q. Next sentence:

(89) "The swinging of the point of the tool 37 through the arc above described was effected by the action of the cam 43, all as shown in Figs. 6 and 7 of the Gordon patent."

That is also a correct statement of the operation of the machine? A. I think that is correct.

Mr. Spohn: Now, if your Honor please, I haven't objected heretofore to any of this. I move all the examination and the testimony of the witness subsequent to my admission on the record of 1-A of 35 be

stricken. The account as filed was an account of the profits, gains and advantages derived by the defendant. This is denied on the ground of lack of relevancy. The only effect this Gordon machine has ever been claimed to have in this proceeding was on special damages, and that was not on the account at all. The denials were on the basis of lack of relevancy as to profit, gains and advantages actually received.

The Master: You admit the truth of the statements made.

Mr. Spohn: Sure, but totally irrelevant.

* * * * *

(95) The Master: So far as this witness is concerned now, since Mr. Spohn has explained the basis of the objection to these answers, I presume it is unnecessary for you to go on and question this witness about whether or not the statements themselves are true. He doesn't deny the statements.

Mr. Spohn: The denial was on the basis of immateriality and irrelevancy for the purpose of the accounting, as we understood it, which was the profits, gains and advantages.

Mr. Farley: I am quite willing to make time, if I can. It will be understood that upon further examination the witness would admit the accuracy of these statements made by us. I am quite willing to let it go at that.

Mr. Spohn: Oh, no, not the rest of it.

(96) The Master: To the point he has admitted so far.

Mr. Spohn: Down to that material he has quoted.

The Master: And you object to the rest of this answer?

Mr. Spohn: It is all previous. The objection to the other answer goes to the mode of operation.

The Master: Does the objection of your other answer go to the truth of the statement made, or to the materiality?

Mr. Spohn: Well, as I understand it, your Honor, from the point on that counsel has examined, it would go to the question of both truth and materiality.

The Master: I think insofar as it goes to the truth of the statements made, I will let counsel continue to question on that, and I wish, if there are some statements made where there is no dispute about it, about the truth of the statements that you would, when it is taken up, so state, so as to speed this up.

Q. (By Mr. Farley): The next sentence begins, "The mode of operation." I suggest to perhaps save time that counsel run over that. It won't take you over five minutes or so.

The Master: We will take a recess.

Mr. Farley: And we might save a good deal of time.

The Master: Yes, sir.

(Recess.)

Mr. Spohn: If your Honor please—

The Master: Just a minute, before you proceed. Off the record.

(Discussion off the record.)

Mr. Spohn: Now, if your Honor please, during the interval we have attempted to go through those various questions counsel **(97)** referred to, and the answers, and as I stated when we stated our denials, and so forth, they were stated merely as being rejections of that particular answer to the question, because it was not used by the plaintiff in any way. It was not to be used by the plaintiff on the question of profits, gains and advantages.

We did not attempt, of course, to deny the truth of those things, but we did deny the relevancy and materiality of them.

We have tried to go through those questions, and we believe the fast procedure would be for counsel to take them sentence by sentence, and take them on the truth only, and we raise the objection as to materiality and relevancy, and also I don't believe this is proper cross examination. It is not matter gone into on direct examination at all.

The Master: Well, I was wondering about that particular question myself, but Mr. Gordon was testifying without objection on that point.

Mr. Farley: The point there is, if your Honor please, it is of great importance to the defendant that they establish the truth of the statements set forth here. Mr. Gordon, through his counsel, has denied the truth of these statements.

Mr. Spohn: No. I am sorry that I used the word, "deny." What I should have done was to use the word, "rejected." We did not intend to use it, or in some instances we denied it as not being true.

The Master: What about the rule permitting cross examination of adverse witnesses? Isn't that incorporated?

Mr. Spohn: Is the defendant on its case now? I would **(98)** like to know if the plaintiff is through here.

The Master: Aren't you starting your case?

Mr. Farley: This would be, of course, naturally part of my case, but it takes the form of cross examination of Mr. Gordon, not only as to his former testimony, but as to the points of our case set forth in our statements of account, and I was going to mention a while ago when we had the discussion about without the scope of the direct examination that the rules, of course, permit liberal cross examinations of an adverse witness and adverse party.

Mr. Spohn: I appreciate that very fully. I am not taking the position counsel cannot call, under your Honor's ruling, an adverse party for cross examination.

I have always maintained the new rule should not apply to this case, but your Honor having ruled the rules do apply, then under the rules, a party can be called adversely.

The Master: I don't think the rules, as a whole, apply, because there might be specific rules that it might be impossible or impractical to apply, and the rules state that the Court will have discretion to apply the rules to the extent they are practicable.

Mr. Spohn: If your Honor please, you remember when we were on our accounting we called Mr. Wibel as a witness, and we were then confronted with the proposition at that time, with counsel's statement, that the Federal rules at that time did not permit the

calling of an agent of the adverse party for cross examination, and we called him as our witness, or if we called him we had to call him as our witness, and I did not call Mr. Wibel at **(99)** all. It is a poor rule that doesn't work two ways.

Mr. Farley: You must remember at that time we were working under the Federal equity rules and the new rules had not gone into effect. There is no reason why I should advance the date the Supreme Court said they should be made effective.

Mr. Spohn: My argument wasn't that. It was toward the discretion of the Court making applicable to one side of this lawsuit, rules which were not available to the other side at the time it put in its case.

Mr. Farley: The fact still remains that if it should be ruled, Congress should make a law to the effect that there be no recovery in any particular case where the mere use of a machine is had, and up to the present time that law would be not in effect, then subsequently go into effect, I am sure I couldn't be blamed to take advantage of the changes in the law and changes made.

Mr. Spohn: It is not a question of advantage.

Mr. Farley: Let me say this. There is no effort on my part, there will be no effort, so far as Mr. Wibel was concerned, and I had fully contemplated bringing Mr. Wibel in as a witness, and I am going to produce him as a witness, and you will have ample opportunity of cross examining him, but on this particular point we are now talking about, as to these denials, the denials as to these particular questions and answers about which I am now examining Mr. Gordon, those statements are relevant to matters in connection with which Mr. Gordon is fully advised of the facts.

Obviously I can't cross examine Mr. Spohn to get the denials.

(100) Mr. Spohn: You could, but you wouldn't get any information out of me.

Mr. Farley: No, because you probably don't know anything about these things, but you denied them just the same.

Mr. Spohn: If your Honor please, I did not press the matter in Milwaukee on the strength of your Honor's ruling with respect to these rules.

I think it is a serious matter in the middle of a lawsuit to switch horses, to have one set of rules that obtained when the plaintiff was putting in its testimony—

Mr. Farley: Blame the Supreme Court.

Mr. Spohn: I am addressing this to the discretion of this Court. It has it in its power to alleviate us from the rule. As I understand it, the Court has that power.

Here is a lawsuit that began in 1930, and so far as the plaintiff is concerned, it is approaching its conclusion.

The only time we attempted to call an agent we were definitely met with the proposition under the rules then existing that we couldn't do it, and we did not call that witness. We did not examine him. It would seem to me it is equally within the ability of counsel to prove anything he wants to about this Gordon machine by direct testimony, if he wants to do it, and if it is material.

The Master: On this point, why, Mr. Gordon is the man who should know more about it than any witness.

Mr. Spohn: If he can call him on direct examination, that doesn't mean he has to call him as an adverse witness to do it.

Mr. Farley: In view of your statement, we can prove this **(101)** by direct examination, I am going to state that everything stated in these answers are based upon the testimony of Mr. Herklotz before Judge Tuttle.

Now, counsel has been willing to accept 100 percent the statement of Mr. Herklotz, perhaps made inadvertently or without thinking. Further, as to certain aspects of the case, if they are equally willing to accept Mr. Herklotz' statement, as I have endeavored to bring them out here, as true, it is quite all right.

Now, the point is there is a bigger question involved, if your Honor please, than a mere adherence

to a rule of procedure. The question involved, insofar as this objection is concerned, is really are all of the facts in connection with this litigation to be placed before the Court, or is plaintiff, by relying upon the provisions of the new rules, which state that that is within the discretion of the Court, in attempting to make it appear that they are being placed at a terrible disadvantage, is that going to prevail with the Court in precluding us from bringing out and showing to your Honor what the true facts are?

The Master: I will overrule the objection without binding myself to any decision with respect to any other witness.

I think Mr. Gordon is very capable of testifying on these questions, and it would be undesirable if his testimony were not permitted on them, in view of the fact that the new rules permit cross examination of an adverse witness, and that the rules further state that they shall apply except where the Court deems it undesirable. I think that this line of questioning is competent.

(102) Furthermore, I think we are spending a tremendous amount of time on questions of objections to testimony.

Where there is an important evidential question involved, naturally counsel do not want to waive the opportunity to present their objection, but I think there is something to consider so far as possible in trying to expedite these proceedings when there is no serious harm that will be done by waiving a possible objection that might be made. Go ahead.

Q. (By Mr. Farley, continuing): Will you read the first sentence there, the second paragraph on page 13, Mr. Gordon, and state whether that is true, "The mode of operation of the Gordon machine—" A. You wish me to read it aloud?

Q. For your own information. "The mode of operation of the Gordon machine was to oscillate the tool about its cutting point as a center for the purpose of maintaining the side cutting edge of the tool substantially normal to

that portion of the work to which the point of the tool at any instant was in contact."

That is correct, isn't it? A. That is correct.

Q. The next sentence:

"Due to the swinging of the tool upon its point, it was necessary that the cam 44 be designed to swing the tool holder 34 through an angle of approximately 80 degrees while the work was turning through an angular rotation of 6 degrees."

That is also correct, isn't it? A. I couldn't say whether that is correct or not. That would have to be checked.

(103) Q. Well, will you glance at the Ford camshaft drawing, Exhibit 3 attached to Exhibit A, and I call your attention to the view at the top of the page, reading section AA, and included angle of the nose of the cam is about 6 degrees, isn't that true? A. That depends entirely on how much of it you call the nose. The nose begins at the base line and carries up to the extreme left. If you speak about just that portion of the nose that is included in 6 degrees, why, then you would have something more definite. It is very difficult to say.

Q. Very well. Refer to the part here in the drawing to which the lead line goes. ".062-R." That means there is a radius of one-sixteenth of an inch on the nose of the cam? A. Yes, sir.

Q. That is the section of the cam I am referring to as being approximately a 6 degree included angle? A. I would say it was correct, approximately; that the 80 degrees is correct.

Q. "Because of the impossibility of effecting a movement of approximately 80 degrees of the work holder 34, during the 6 degrees of movement of the work shaft, it was impossible to control the movement of the cutting tool and to keep the roller 53 in contact with the cam 44 as the tool was passing around the nose of the camshaft, the roller dropping through space without touching the master cams while the tool was going around the high point or nose of the cam."

That is a statement made by Mr. Herklotz when he testified, and would you state whether or not that is a correct statement or a truthful statement? **(104)** A. That is very decidedly incorrect.

Q. You think that is very decidedly incorrect? A. Yes.

Q. You think he was untruthful when he made that statement? A. I wouldn't say that. I say the statement is incorrect. He might have been mistaken. I don't say a man is untruthful, and I don't think he could prove in any way that it was a correct statement, because it certainly isn't an impossibility, the movement of 80 degrees of the tool while the shaft was rotating 6 degrees. There are many pieces of mechanism much heavier than that that are moved at a greater speed, and furthermore, I don't believe that he could show that the roller 53 in contact with the cam 44 as the tool was passing around the nose of the camshaft, the roller dropping through space, without touching the master cam while the tool was going around the high point or nose of the cam.

I don't believe there is any truth in that at all. The cams are all designed so that the roller is sliding down an incline. If it were dropping through here, then it wouldn't touch this face of the cam. If it is on an incline, it rolls over there and down that part of the cam. That is the way all cams were designed. If you could see the drawing—I think you have a drawing of that cam.

Q. Yes. I am going into that with you later. A. Yes. I think that will demonstrate just what I mean by that.

Q. I think it will.

The Master: If you have a sharp pointed nose on your cam do you have to have a master cam correspondingly sharper indentation, **(105)** or whatever you call the part of the master cam?

A. The drop, you speak of the drop in the cam?

The Master: Yes. Must that be a much sharper drop if the cam that you are turning is pointed, than if the cam you are turning has a blunt nose?

A. Yes, that is, the angle of this part of the cam from the nose down would tend to be nearer a radial line in one case than it would in another. The smaller the nose of this work piece there would make this nearer to a radial line and of course if that were a radial line and this member fulcruming from this distance away and located in the position it is, why it is quite possible that it couldn't follow

that, because this departs from the position where it would control that, but that isn't true. I don't know of a cam being made that this line here ever went inside the diameter. If I remember correctly, this was one and three-eighths in diameter, and that line from here going down here was always this side of the center, that is, it was not a radial line, and that gave this an opportunity to roll down that face. If it rolls down the face it certainly isn't dropping in space.

Q. If you made it that way could you keep the cutting edge of the tool in the correct cutting position at all times? A. As we demonstrated in the drawing we made for you.

Q. I see. We will examine that a little bit later. A. Yes.

Q. Very well. Then you agree to the 80 degrees of movement of the work holder during but 6 degrees of movement of the work shaft, but you disagree with the balance, is that the idea? **(106)** A. I only agree to the 80 degrees. It looks offhand as though it is approximately that.

Q. "Due to the principle of operation of the Gordon machine, and the impossibility of controlling the tool movement, the tools undercut the side of the cam on the near side of the nose as the camshaft was rotated towards the tools." A. I say that is decidedly a misstatement.

Q. Didn't you testify in the proceeding before Judge Tuttle that at the Ford plant you got hollows on one side and humps on the other side? A. Possibly I did, but I didn't say it was due to the things stated in that sentence.

Q. All right. Then, whatever the cause may have been, the tools undercut the side of the cam on the near side of the nose and left a hump on the far side, that is true? A. In some cases it was, but from an entirely different cause.

Q. Now, go to the next sentence.

> "The rocking motion of the tool holder 34 was retarded by chips that got in between the rotating surface of the tool holder and tool holder base."

That was true, wasn't it? A. Not to my knowledge. I wouldn't say it didn't do that, because that is possible in any cutting tool. Chips get in very peculiar places.

Q. If that did occur, then— A. (Interposing): But after we operated a good many machines there we didn't find that difficulty.

Q. Yes. And if that did occur, however, that would tend, as the **(107)** sentence says, "Which tended to increase the difficulty in keeping the tools at the proper cutting angle." If the chips got in there, in the tool holder 34, that would do it? A. That would be possible, if the rocking member was blocked in any way, why, of course, it would change the angle of the cutting edge.

Q. (Reading): "The springs 59 which governed the action of the levers 52 for rotating the tool holder 34 became weak and broke frequently."

Is that correct? You did have some difficulty with springs breaking? A. We had several springs that broke. Whether it was due to weakness or because they were too stiff, that is the question.

Q. (Reading): "And undue wear on the keys and keyways of the shafts that held the developed master cams 43 and 44, increased the difficulty of maintaining the tools at the proper cutting angles."

You had that difficulty, too? A. I don't know that we had that difficulty. We didn't have—yes, we did. We had to correct position of one cam on that shaft, and whether it was wear or whether it was a misplacement originally, I couldn't say.

Q. I may be mistaken, but it seems to me you testified before Judge Tuttle that some of these keys broke from time to time? A. Well, whether they were those keys I was testifying about, I don't know.

Q. They would be the only keys of any importance in the machine? A. There are many keys in the machine.

(108) Q. Oh, yes, gears and keys on driving and feed gears and things of that kind, but you had no difficulty with any of those breaking, surely? A. I don't remember of it.

Q. Well, would it be your testimony that that is untrue, as Mr. Herklotz testified? A. You are speaking now of what, of the spring 59?

Q. The last three lines of the paragraph, "And undue wear on the keys and keyways of the shafts that held the developed master cams 43 and 44 increased the difficulty of maintaining the tools at the proper cutting angles"? A. No, I don't think that is true.

Q. You don't think that is true? A. No, sir.

Q. If, however, you had testified differently before Judge Tuttle would you say you were mistaken then? A. I might have had a different understanding of the proposition. If this was only wear, the effect would be so slight on the cutting angle or cutting edge of the tool you couldn't find it. If the key was sheared off so that the cam took a materially new position on the shaft, why, that certainly would change the position of the angle. I don't know of a key shearing off in any machine.

Q. Let us go to 37.

"One Gordon camshaft turning lathe costs $4,355."

Is that correct? A. I think it is.

Q. And that is all covered by the exhibits referred to there.

(109) "Date of acquisition of machine 5-16-1923."

That is correct, isn't it? A. Well, I won't say anything about the dates. It probably is correct, but I don't know of my own knowledge.

Q. (Reading): "Date of first use immediately after the date of acquisition."

Is that correct? A. Well, I wouldn't know of my own knowledge, because I didn't see the machine at that time.

Q. All right. A. Either before it went there or after it got there. I assume that it would be used, set up and used immediately.

Q. At least it wouldn't be your position that was untrue? A. No, sir.

Q. Next sentence:

"The machine was sent to the Willard Machine Tool Company for repair and rebuilding 8-24-1923 and was returned to the Ford Motor Company 12-23-1923."

I think you will admit the correctness of that, with the possible exception that you haven't those particular dates in your mind? A. That is correct, as near as I know.

Q. If the exhibits which have already been filed in the case show those dates as given, I think you will agree those dates are correct? A. I would.

Q. (Reading): "It was then finally returned to the manufacturer permanently 7-30-1924."

Is that in accordance with your recollection? **(110)** A. Approximately, yes.

Q. Now, "unit production per hour while in operation, approximately five." A. That is incorrect.

Q. That was testified to by Mr. Herklotz, as I understand. "No permanent cost records were kept by defendant with respect to the cost of producing camshafts on this machine." That, of course, I suppose you don't know? A. I wouldn't have any knowledge of that whatever.

Q. All right. I don't need to bother with the next one. Let us go to 38.

> "The number of tools employed in the Gordon lathe were eight for the F-446 model shaft. The type of tools are as shown in Figs. 6 and 7 of the Gordon patent."

A. I think that is correct.

Q. We had, as you recall, one of those tools down as a physical exhibit during the trial before Judge Tuttle? A. I think that is correct.

Q. (Reading): "Two sets of eight additional cutters were made by defendant Ford Motor Company at an estimated cost of $3.25." A. I think that is correct. At least, I was told that was what was done.

Q. (Reading): "After further operation the tool holders were changed to a square tool bit by fastening a plate on the side of the slide at an estimated cost of $6.50 apiece, or a total cost of $52."

You know about that, too, don't you? I think you testified about that before Judge Tuttle? A. I don't think there was a plate put on the job. As I remember, **(111)** the hole was a squared hole and was drifted into the tool holder.

Q. But the bit was changed? A. It was used on some of them.

Q. You agree to the correctness of it except for the cost given? A. I agree that some of the tools, I think not more than two or three anyway, I think the rest were all the circular tools that were made for the original machine.

Q. Now, it says, "cost of additional tool bits one and one-fourth by one-fourth by one and one-half inches long, 25 cents per tool, or $2 per set."

Does that look like a reasonable cost there to you? A. That probably was. It is only an estimate, anyway.

Q. As to the next sentence, "No written records of these costs were kept and the above costs are estimated." Do you know anything about that? A. No.

Q. (Reading): "39. The tools made as stated in answer 38 were all for purpose of replacing tools formerly in the machine." A. The tools made by the Ford Company?

Q. Yes. A. Yes.

Q. Now, number 40. "The repairs and maintenance of the Gordon machine, as described in question 36 involved the time of two men 16 hours a day, not including production and tool room, foreman's supervision during the entire tryout period of approximately 200 hours actual running."

What do you have to say about that? A. I would say that was entirely wrong. During my time there were **(112)** many days that no one was anywheres near the machine, other than myself and an occasional time when the foreman of the department, the grinder department, came over and talked with me about the work, but there was nobody around.

Q. All right. A. Not one man, let alone two.

Q. You heard the testimony of the man, didn't you, in the main case, in which he said he was assigned to those machines from the time you first came, until the machines went out? A. Maybe he was assigned, but he was not there. Those things happen in a shop.

Q. 41 and 42 we can gloss over, because you don't know anything about the records of the Ford Motor Company. With respect to 42, I believe in answer to a similar question relating to the Walcott machines, that that was admitted by plaintiffs, but it appears they denied this that has to do with a record kept by the Ford Motor Company.

Mr. Spohn: We deny its materiality.

Mr. Farley: Well, the point is, I believe, as to whether no records were kept of individual power consumption of individual machines, that was admitted so far as some other machines were concerned.

Mr. Spohn: The Walcott machine particularly. That was relevant.

Q. 43. "There was no operation prior to roughing the cams except that defendant rough ground the contour of approximately 120 camshafts to present an even amount of stock for Gordon lathe to help and improve its operation."

(113) Do you know anything about that? I think you testified you had some difficulty because of the dies in the foundry leaving too much flash, or something, and some of them had to be ground? A. What we call snagged.

Q. Snagged? A. Yes. It left so much metal there where the forging dies came together, it left what we call a flash, that the amount of metal, the depth of metal that had to be turned off was from a very light amount to as much as three-sixteenths of an inch.

Q. So that they did do some rough grinding? A. I don't know how many they did. It was not my recollection that they ground anywheres near that quantity, but I did run a number of them through the machine, just snagged that off in the turning machine, and then set it for the finish sizes. I wouldn't say how many now I did that to, but there was some of them snagged.

Q. Of course, you would not agree with the number and the estimated cost of doing that, I assume? A. Well, there was something wrong if they cost that much.

Q. Now, "the amount of shafts scrapped due to poor machining on lathe approximately 60 percent." What do you have to say about that? That is something apparently that you would not know anything about, is that true? A. I wouldn't know anything about the ones that were turned the first time the machine was there, because I was not there, and the ones that were turned while I was there, there was some of them scrapped. Just how many I wouldn't say, but I wouldn't **(114)** say it was 60 percent or anything like that.

Q. "44. The operations performed on the cams of tractor camshafts subsequent to work thereon by the Gordon machine were substantially the same operations—" Now, this was amended. We substituted a new paragraph for that. "Were substantially the same as shown on operation sheet Exhibit No. 17, except that due to the necessity of leaving a greater amount of material on the cams for operation No. 23, finish grind cams, the time required for operation No. 15, 'harden' had to be increased to insure a deep penetration of the case hardening, and as more material had to be removed, the time of the finish grind cams operation was necessarily increased."

Do you know anything about that? A. Yes, sir; I know very definitely about that. When we operated the

machine while I was there, our endeavor was to keep the amount of stock below twenty thousandths. That would be ten thousandths on a side. On the Melling machine, when it was in operation in close proximity to our machine, I checked up some of them, and they ranged anywheres from fifty to sixty thousandths on both sides, which meant from twenty-five to thirty thousandths on a side.

Now, by that time our machine had been condemned. We were trying to hold it to very little grinding, according to instructions.

There was nothing on the drawing, and the only information we had was our experience with other manufacturers, and that was what was ordinarily done. I don't know of a single manufacturer where they pretended to leave any such amount of stock **(115)** to grind as they did at the Ford Company, for the reason that practically all of the camshafts were carburized for hardness and that means it left a case around the outside of the shaft, a hard case, and if you ground that much off, you would grind through that case. Otherwise, you had to carburize so deeply it was an expensive operation. It was done by putting the shafts in a pot with carburizing material and keeping it up to comparatively high heat for many hours.

Q. If the Gordon machine left a hollow on one side of the cam and a hump on the other, that would increase the necessity, would it not, to have a deeper penetration of case hardening? A. Yes, sir; anything that departed from the correct shape of the cam so as to leave a uniform amount of material to be ground off all the way around would, of course, necessitate deeper carburizing.

Q. I think that is all of the answers that have to do with that particular phase. A. All right.

Q. A while ago you said, Mr. Gordon, that the hump on one side and the hollow on the other side did not come from the statement made in this answer, which was that due to the principle of operation of the Gordon machine and the impossibility of controlling the tool movement, the tools undercut the side of the cam on the nearer side of the nose as the camshaft was rotated towards the tools and left a hump upon the far side of the nose. I was reading from page 13 which is part of the answer to paragraph 36. While you admitted there might be humps and nicks, you said it did not come from that reason. Do you know why

that **(116)** happened, the humps and hollows? A. I have a pretty good idea and also a pretty good idea of why it couldn't have happened for the reason you have given. I would like to show that to you and the Master, if you care to look at it.

Q. Very glad to.

The Master: Just a minute, before you do that. Is it defendant's contention that the reason it was necessary to leave a greater amount of material on the cams for the semi-finished grinding operation was because of the fact that the Gordon machine left a hump on one side and undercut on the other side?

Mr. Farley: Yes.

The Master: In other words, you left a larger, according to your contention, you left a larger amount of material for the finish grinding process to correct that?

Mr. Farley: Yes, because you can readily see if you have a hollow in the face of the cam, like this, instead of the correct shape, that would have to be cleaned up thoroughly in the finished grinding, so that you got the exact contour provided, otherwise your valves would not operate properly and it is very imperative that you get the exact contour provided for in the finished drawings. Of course, then, in order to get that, you had to leave a greater amount of stock to make sure that you cleaned up.

Now, then, if you had a hump on the other side and you left a great deal of stock to clean up, you know that on this case hardening operation, the penetration is very slight, just a few **(117)** thousandths. Here the penetration would have to be 25 or 30 thousandths. If you had a hump on the far side and it was 30 thousandths and you had to grind away all the case hardening there in that place where there was a hump, you would have a soft spot in the cam. You agree with that statement?

Q. Yes, but it is a little bit general. It is not true. I would like to explain to you why it is a misstatement.

Now, this member here carried the tool, and the tool point is fixed in this swinging arm, relative to the arm. That is, the tool is built like this and it swings around that

point. That point isn't running up and down and in and out or anything else. That whole member there swings around that tool point like that (indicating).

The Master: Yes, sir.

A. So that never varies in relation to the rest of this arm. Now, here we have a cam, this dotted line shows a cam that controls the swinging movement of that member.

The Master: Yes.

A. Now, if that point is fixed in the arm and the arm is swung a point up here, this tool or this arm can't at any time come in beyond what it is supposed to be in getting the form of that cam.

If this roller here pushes this in, pushes this arm in, that is, the spring here is what holds it back against this cam.

Now, the tendency there is at all times to hold that roller against that master cam, which makes the form of this, regardless of the angle of the tool cutting edge of the tool. **(118)** The point is under the control of this dotted line cam.

Now, then, the angle of the tool is made by this other cam, and if we have got the wrong angle of that cutting, that would tend to push away, or something of that character, but this cam here is the one that controls the shape.

Q. All right. In your machine, the tool is held back or the piece which carries the tool is held back so that the cam which controls the contour and regulates the point of the tool which you have just been describing to Mr. Quaife is affected by this spring 49, isn't it? A. Yes, sir; controlled by that spring, yes.

Q. And if the work coming around your tool is not at the correct angle, the only thing which would prevent the tool from gouging into the work and making a nick on that side would be the functioning of the spring 49, isn't that correct? A. That is correct. This is the only thing that keeps that from departing from that position that would make a difference, but there isn't anything to make it do that, that is, in this member here or the rest of the mechanism, the thing that would make it do that was the fact that on the work cam—let us make a picture of it here.

There is the cam. Now, if the flash, that is, if that were forged and that were the parting line between the

two dies, the metal that squirts out here and here is what makes the flash, and that flash, if the trimming dies cut that off there and cut it off here, you would have that much more metal.

This is the finish size in there. You would have that much to cut off instead of that much, and they spring the shaft **(119)** and do everything else when you try to cut all of that off at one cut.

The Master: In other words, you would attribute the difficulty in the hump or hollow on one side to the fact there was too much flash?

A. Very irregular amount of material to be cut off the cam. Some places there would be a great amount, and others a very slight amount. There are eight cams being cut. The effect of one cam, by the cutting pressure on the adjacent cam or some other cam in that proximity, would have an effect on springing that shaft.

When I went in there on that job, I found that the center bearing on the shafts which ultimately you turn varied so much that I couldn't get some of them in the steady rest to hold it in that position. The steady rest on the center bearing of the shaft, and others were so loose they could flop all around. There was no control of them. That is within many thousandths. Now, if they could flop around in there, then of course you get any kind of an old piece, because it was to a large extent due to the pressure of the cutting tools and the variations in the amount it had to cut off at different points.

That cam is here and the next cam might be over here. The tools were all cutting on one line.

If this was getting a heavy cut here, it would affect the cut on this part here. This part here, the base line of the next cam, wouldn't affect this one up here, because it wasn't cutting up there at that time, but when it is turning the top only and there is a great mass of material to come off there, **(120)** that is going to affect the cutting of this one.

It is not very easy to explain all that without a cam there so that I could illustrate it, but I don't happen to have one.

The Master: Did you observe the operation of the Walcott machine while you were in the plant?

A. I spent weeks watching it. I watched the operation of that. I have watched the operation of them since the first one was made. Mr. Melling invited me to see it operate.

The Master: Did they furnish the same type of camshafts to be finished in the Melling machines?

A. Yes, sir. And the reason why they were able to do a different job than we were, was because they took that in two cuts. They first took a rough cut and the machine automatically went back, the tools went into the finished position and took the second cut, and the second cut on that cam was a comparatively light cut. I don't think they averaged 1/32nd of an inch deep, and it was fairly uniform all around. On the rough finish it varied 500 percent in the depth of the cut at different points on the cam.

The Master: Do you know enough about forging operations to say whether in your opinion the rough forging operation of the Ford camshafts was inferior in quality; as to whether they could very simply have forged them in such a way that they would have been suitable for your machine?

A. Anything that you do on the forging dies for a piece like that shaft is expensive, because they are quite heavy and they are hardened and quite expensive material, and they let them—they **(121)** use them as long as they can without getting beyond possible means of machining them, but I have seen shafts in some shops where they left a great deal more metal than they did at the Ford plant. There was one plant where we had two machines and we made no pretense at all in cutting it in one cut. We deliberately run them through with two cuts; put them in the machine twice.

Q. That was the Studebaker, wasn't it? A. No, at the Reo, and I asked them to try to get them to correct the dies, and they told me—I don't know as I ought to say it. If you want to know, I will tell you. They told me the management there was interested in the forge plant and they refused to correct the dies. We have 5/16ths of an inch to remove. Anyway, that is the condition. The Ford dies, the forging dies, when they were new, I think, were equally and maybe a little superior to the average, but like every-

one else they let them wear until they got to where they felt they shouldn't re-sink them, and I don't think Ford was any worse than anybody else in that respect, because it was a question of how much does it cost and what benefit do they get by re-sinking them.

Q. Now, Mr. Gordon, I don't recall anywhere in your answer, although you would not agree with the statement in our statement of account, that the principle of operation of the Gordon machine, and the impossibility of controlling the tool movement had anything to do with the tools undercutting on one side and leaving a hump on the other, I don't recall that you gave any explanation as to why that would occur? A. I just got through trying to explain it. It was due to the **(122)** irregularities and the amount of material that had to be turned off the cam.

Q. Due to the flash? A. Due to the flash largely, or to the way they were centered.

Q. Just where is the flash located? Is it located up there on the nose of the cam? A. It was right on the side of the cam in some cases. On others, it is on the base. The Ford cam had a flash like that, right on the side of the nose of the cam. That tool coming around there would get hold of that and spring that shaft.

Q. That was on some of the cams only? A. Absolutely. The flash, that is, the parting is always on one plane. The parting, I would say, was across there. Now, then, you couldn't get a flash on this one up here, because no flash was made there, but there would be a flash on this side and a flash on the nose, and when we attempted to turn that off, if there was excess metal there, of course it would disturb the location of the shaft or spring it. That was one of the reasons.

The Master: With a given amount of flash on two different camshafts, one of which requires a very sharp nose and the other one of which requires only a relatively blunt nose, is the tool more likely to be sprung with the sharp-nosed camshaft of the cam than with the other one? Is there any relationship there between the pointedness of the nose and the likelihood of getting into difficulty of this sort?

A. Well, I would say in a general way that the sharper the nose point, the more difficult it was to turn it, just the

same as **(123)** you had if a piece were perfectly cylindrical, why you wouldn't have that varying condition at all. What makes the variety or the varying condition is due to the nose of the cam, and, of course, when you are travelling, when the tool is cutting up this side, the condition is somewhat different than it is around the base line, and when you are setting it on the other side it is different again. The same as it is on the Melling machine. The speed of cutting on the Melling tool is very rapid going up the sides of the cam and very slow in going around the nose of the cam.

Now, people have been trying to use that as a reason why the Melling machine was better than the Gordon in this Ford case, but you have one advantage and one disadvantage.

The 100 percent condition would be where it was perfectly cylindrical and the conditions were the same all the way around.

When you have got to sweep the cutter up the side this way and then go down with the point and then sweep up again on the other side, why, you have got a condition that certainly isn't very good.

Q. (By Mr. Farley): On that point, Mr. Gordon, I have made a couple small sketches, and I will have this marked Exhibit 208. I think 207 was the last one.

(Sketch marked Exhibit 208.)

Q. And I will mark the first figure Fig. 1. Now, I have attempted to represent a circle. It was drawn freehand, and I will mark this one rectangular thing T, supposed to represent a tool of the lathe. Now, assume you are cutting the circular piece you have been talking about, the ideal condition, is it not, for **(124)** effective cutting is to have the tool located so that a tangent passing through the point of the tool, your tool is located substantially normal to that tangent, of course, making allowances for whatever positive or negative rake you are going to give the tool. That is the theoretically ideal condition, isn't it? A. No, I don't think it is. We very seldom see that in actual practice, where the tool is held in that normal to the tangent; very seldom see that.

Q. You are talking about having a rake where I am drawing now? A. It might be a rake and it might be the

other way. For instance, may I make a sketch on this? You have already got a dotted line out there. That shows the diameter of the rough work.

Q. That is right. A. Now, then, this tool is cutting from here to here. It is reducing the stock to that depth. It is not doing that with the point of the tool. It is doing it with the side of the tool and it is the relation of the tool to the material that it is removing that is the important thing.

Q. Yes, but— A. (Interposing): That is true, isn't it?

Q. Yes, but if you vary your nose of the tool—I will make a sketch over here on the right-hand side of the sheet, upper right. Now, if you vary your tool, and I have drawn the tool with a very sharp rake, and I will mark that tool T-1, and I will mark the part which we call the rake R. I will mark this other part, the inclined line to the vertical C. The part R is what is called the rake, that is true, isn't it? **(125)** A. What kind of tool is that?

Q. It is cutting on the front and side? A. Is it cutting on a radial line or is it cutting longitudinally of the cylindrical part?

Q. The same kind of tool we have been talking about. Assume the tool on the far side from what is shown on the drawing has a cutting edge that is going to cut on the side, and you make some clearance to do it that way and you give it a side rake such as I have sketched here below. I will call the first one Fig. 2 and I will call the second one Fig. 3. Now, this is a view looking towards the front, and the tool, as we assumed over here, is going to be cutting on this edge which I mark SE, side edge, and also is going to bring the work to its finished diameter upon the point which I have marked P in Fig. 1 and point which I mark P in Fig. 2. You are familiar with a tool of that type, aren't you? A. I am familiar with a tool as you describe it, but not as you draw it. I will see if I can make a little sketch that will probably help. Now, there is a tool that cuts this edge. This edge is higher than this edge. You see that, your Honor? This is looking straight at the side of that tool, this edge here being higher.

Q. As shown in this figure here? A. Yes.

Q. Figure 3? A. That tool is higher on this edge, and the work, the material it is removing, we will say, it is up

to there, and the finished material is down to here, so that this edge along here is doing **(126)** the cutting.

The Master: It is higher on the edge.

A. That is doing the cutting. This one is not. This one here is higher on the point which is not doing the cutting.

Q. You are indicating that line that I drew which is supposed to represent the same thing? A. I didn't say that line.

Q. I am assuming a tool with a sharp point, and you are assuming a round-nosed tool over there in your Gordon machine, but you used a sharp-pointed tool in your Gordon machine? A. You could have used a tool like that.

Q. Well, now, assuming a tool of that type, set your tool so that your reaction of work being removed will be substantially along the same line with the tangent at this point, that is the ideal condition, isn't it? A. I wouldn't say that, no. The point is you have got to have metal being removed, you have got to have that so that it is cut off it rolls away from the finished work.

Q. Suppose, instead of having your tool as I have sketched it in Fig. 1 with the reaction between the tool and the work being removed, the excess stock being removed, is not located on the tangent, but the tool is located off at an angle so that the reaction on the tool would be as I have drawn it by a dotted line or a dashed line which I have marked L, what would be the result of that sort of a condition? That is not the condition you want to have, is it? A. I don't just get the picture you are trying to tell me about.

Q. Suppose you have your tool extending in on this angle which I **(127)** have marked N, that is what you would call a negative angle, isn't it? A. If this was the edge on this tool that is removing the work, and instead of your having it higher, you had it lower than this side, why, you would call that a negative angle. It wouldn't be cutting. It would be more or less pushing.

Q. And if the tool were around the other direction which I have marked, drawn the dotted line N′ necessarily the tendency would be to push away from the work? A. Yes, the negative.

Q. Whereas in the second case the tendency would be for the tool to dig into the work? A. What we call hog in, yes.

Q. Now, the ideal condition is, however, to have your tool so that the reaction between the tool and work is along the tangent, that is the reason for having the tool normal? A. Yes. It very seldom is normal. They try to make a free cutting tool that will have a positive rake in cutting steel.

The Master: Didn't you state once the ideal condition with your machine was for a line between the point of the tool and the center of the circle from which the tool projected would be normal to the tangent, to the cutting point?

A. I don't know whether I said that or not. I don't think I did, but I did say that the cutting edge on that tool is positive to the material that it is removing, and it has very little bearing on its position in relation to the finished surface, that is, the finished diameter. We will take, your Honor, supposing you took a piece like that, that is, a flat piece of work and your **(128)** tool comes down here and this edge is higher than that edge, and it is cutting this back, we will say it is taking cuts off like that all along on a flat surface. This edge being higher, why of course it would have a positive rake to this much material. Now, it wouldn't be very good to have the point behind the raise of the cutter, because it would tend to curl or sweep down into this, which would cause it to choke up and drag. That is looking at the other angle, you see. That is normal to this surface. If that tool edge were cut back like that, why that would be a negative, that is really in relation to this surface, and it would tend to make the piece curl and interfere with this finished surface, and if you had it out this way, if that tool was higher and struck first on the point, it would have a tendency to curl or chip away from this. It wouldn't come in contact with this at all. To some extent that is the ideal condition, to have the point of the tool have a slight positive rake in this direction, and as much rake as the material will permit the tool to have in the other direction.

Q. In connection with the ordinary operation of lathes, the power which produces the cutting necessary to perform the cutting operation comes from the rotation of the work

piece around the axis of rotation, that is correct, isn't it? A. It doesn't come from that.

Q. You are driving your work in a lathe in the usual manner by a chuck. A. By a motor of some kind or external drive that drives the work. It doesn't come from here. It comes from some other source.

Q. Take your own machine, the power is applied in this machine, as **(129)** you show it here, where, either Figure 2 or 1 will do. A. This is the pulley here.

Q. The power is applied by this mechanism? A. It is applied to this gear and from there to the gear and over to the master cam.

Q. In other words, the power is applied to the tool shaft by means of a chuck which grabs this left-hand end of the work piece and the cutting force, the force which results in the cutting of the tool comes from the rotation of the work piece by means of this power mechanism? A. That is correct.

Q. So your cutting force is then exerted in the lathe by the exertion of power to one end of the work piece? A. That is correct.

Q. Your cutting action comes from the rotation of the work against the stationary tool? A. That is correct.

Q. Now, then, let us look at your Gordon lathe which I represent by the figure which I have marked 4, and we will take that figure as representing the condition which should exist when you are cutting a cam as that cam is approaching the nose and I have drawn the tool in substantially the ideal, normal condition. Now, the work is rotated about this axis which I will mark "O" and out at this point where the tool contacts with the work, which I mark P. You are whipping the work piece at that point through an arc of movement, which I draw through the point of the tool and which I have marked A, and effective force exerted by the work on the tool to do the cutting is **(130)** exerted in the direction of the arc A, isn't that correct? A. I don't think you have stated it correctly, no.

Q. Well, just a minute now, let us get this. Here is your point of rotation? A. Yes.

Q. If your work piece is being rotated by being grabbed at the end, that is your center of rotation? A. Yes.

Q. The point which I have marked P is the point where the tool is contacting with the work? A. Yes.

Q. At that particular point, considering that particular point of the cam, that is when the tool is contacting it and swinging through that arc A, isn't it? A. No.

Q. Why not? A. Because you have got this member here which tends to pull the tool in that direction, towards the point of the work.

The Master: Mr. Gordon, may I make this general suggestion: When you are testifying you have a tendency to refer to different points which you don't get down on the record. You say this and that and point to the thing. Try to designate more definitely.

A. All right.

Q. I probably should have drawn this a little better, but in your Gordon machine, your tool swings always. The trouble is I have shown this a little bit too high, but your tool swings always on the arc through the center of that shaft 24? **(131)** A. This one here.

Q. That passes through the center of the work piece? A. Yes.

Q. So then, any movement of this tool here is definitely and substantially a horizontal line back and forward to the axis of rotation of the work, that is correct, isn't it? A. Yes. May I show that? I want to get the thing so that it is understandable. You admitted you had it wrong. If we put a line through here and call that the horizontal line, then we can see what it is all about.

Q. Very well. We will do that, then. I will draw a dot and dash line here. I have drawn roughly a dot and dash line which I mark D which is supposed to represent the path on which the tool is travelling? A. Yes.

Q. In the horizontal. Now, then, assuming that, the question is, isn't the reactive force the force which causes the cutting of the tool on the work at the point P being asserted on this arc of movement which I have drawn A? A. No.

Q. Where? A. Well, for the finish work you have got two directions of movement. You have got a rotating movement here of the work and you have got here a swinging motion. It is a combination between this rotating motion and this motion. If you had just a rotating motion you

wouldn't get that shape. You have got to pull that tool up that way. You have got two directions you have got to consider.

Q. The movement of the tool back and forth here is very slow, isn't **(132)** it, that is, the movement of the tool effected by the cam 43? A. What do you call slow? You have got to move it from the base line, which might be here, considering that as a circle, you have got to move it from here clean out to here and back again while this rotates from that point to this point.

Q. Your principal force here in performing the cutting action comes from the rotation of the work piece? A. Correct.

Q. And that force, insofar as that force is concerned, it is exerted again on that curved arc A, isn't that true? A. Yes.

Q. And you have then, according to you, a component of cutting force which comes by moving the work piece or the tool holder 23 backwardly about the axis 24 under the influence of the spring 49? A. Correct.

Q. Now, the ideal condition would be, would it not, Mr. Gordon, to have that force exerted along the line which I have drawn an arrow at the bottom of it and which I have marked T; that would be the condition that would parallel the situation in the view shown in Figure 1, isn't that true? A. No, it is not. You have got a condition here. This member here is rotating about this center. Now, this space here, the side of the cam, is constantly changing in relation to the position of the tool, and that is the reason why we have to change the angle of the tool from the time it leaves here until it gets around here. We have got to change it all the way around and back again, so it is always changing so you can't say it is in that direction, because there is only one moment it is in that **(133)** direction.

Q. Wait a minute. Just confine yourself to the conditions I have sketched here. We are talking about things at this particular moment while the tool is doing the cutting at the point P. At that instant the principal force to do the cutting comes from the arc of movement which I have just drawn as A and which is directly on the point of the tool, isn't that true? A. No. I think you are mistaken about that, because the direction of the cut must

be in that direction to remove that material. You can't take a cut off the side of that by pushing this way. You have got to take the cut in the direction of the metal that you have got to remove, and that is in this direction. At that particular moment the stress of cutting is in that direction.

Q. Just a minute. When you say the stress is in this particular direction you have pointed to the line which I have drawn and which I have put the arrow T? A. Yes.

Q. That is an ideal condition. If the stress were in that direction you would have the ideal condition, wouldn't you, the principal stress to do the cutting? A. Yes, on a stationary piece.

Q. One a rotating piece? A. You have got a combination of the rotation of the work and the pull of the tool by these members here.

Q. Yes. But consider just that point. Your work is sweeping down on the point of the tool with an arc of movement that I have drawn at that particular point, and that is moving through **(134)** the arc I have drawn A. Quite obvious, isn't it? A. The point of the tool isn't moving at all? Theoretically it is stationary. You said point of the tool?

Q. I say your work at this point where I have marked P for the point of the tool, the work is swinging through this arc of movement to do the cutting at that particular time where I have marked the letter A on the arc? A. Yes.

Q. And the principal force for performing the cutting comes from the rotation of the work, and that particular point of the work in swinging through that arc, isn't that true? A. Well, that is a question. That force changes. It is the constant change from the base line of the work and the cam work right out to the point where it goes around, because you are pulling up that way and down that way. It is a component of those two movements.

Q. This changes force as your tool moves along there, and as you approach closer, the closer to the nose of the cam, the arc through which the work at any particular point is swinging the parts more and more from the tangent position and reaches its most acute condition just before

you get to the nose of the cam, so that you have a vertical change, instead of being along the theoretical tangent, is more like the condition over here at the mark N′, isn't that true? A. No, because here you have got a fixed tool position at N and N′, and one is negative and the other positive, whereas on this you are supposed to have a reasonably constant tool position regardless of where it is on the cam. That is the purpose of the machine.

(135) Q. And your reasonably constant position is supposed to approach as nearly as possible the position of the fixed tool position? A. Yes, whatever that fixed tool position is that is desired and that it is set up for.

Q. Let us assume again now a position on the other side of the cam, and I will just dot in a tool over there. That is supposed to represent a tool, if you can use your imagination to that extent, and over there. Then assuming your work again, a point P′ of the work, your work on that side, with the tool swinging through that arc there rapidly? A. You mean the work.

Q. Thank you. With the point being cut. A. Point of the cam.

Q. The point of the cam being cut at that point? A. Right.

Q. Is swinging rapidly away from the tool on the arc A, isn't that true? A. The point of the cam is, yes. The tool goes further up that side of the cam, the receding part of the side of the cam.

Q. Yes. And the tool at this point which I have marked P, the speed of the work swinging down through that arc A on to the tool there is rapidly approaching its maximum speed, that is true, isn't it? A. It does reach the maximum speed at the extreme point of the cam.

Q. That is right. Whereas, on the point exactly opposite it would be the same. Now, you said you are familiar with the Gordon machine or with the Walcott machine. Do you have any condition **(136)** at all like that in the Walcott machine? A. Not identical to that.

The Master: With your machine, the work piece as a whole is rotating at uniform speed?

A. Yes, sir. That is true on all the machines, Walcott, Gordon.

The Master: Okay.

A. Or Pioch or any of those machines. The rotation is uniform. That makes the cutting speed vary according to the distance it is from the center of rotation.

The Master: Go ahead with that.

Q. As a matter of fact, in the Walcott machine you have the—

The Master: Was the Walcott tool a side-cutting tool?

A. Yes.

Q. (By Mr. Farley): Now, I have drawn another Fig. 5 and we will assume this is a Walcott tool which I will mark T-2, and we will mark this point here PP, for pivot point of the tool. Now, in your Walcott machine, it is a fact, is it not, that as the tool which I have attempted to sketch and mark T-2 is pointing its—after the cam, rather, is rotating in the direction of the arrow towards the tool, that as the cam to be cut, as the side of the cam reaches the tool and the nose is approaching, the Walcott tool is swung upwardly around the pivot PP, in the general direction of the small arc of the circle which I mark S, that is true, isn't it? A. Yes, sir.

Q. And isn't it true, then, through the entire operation of the Walcott machine, due to that upward swinging movement of the tool, the reaction between the tool and the work is substantially always on a tangent line, similar to the tangent line which I **(137)** mark tangent in Fig. 1 and similar to this S, which I have drawn the line and marked tangent, isn't that true? A. What you mean, I think, is that it is normal to that tangent. Is that what you mean?

Q. I am speaking about the reaction? A. The point of the tool, of course, is always on the tangent line.

Q. I am talking about the reaction between the tool and the work when this tool is doing its cutting as the tool passes up and cam comes down, the force exerted by the work in its rotation against the tool and the movement of the tool is such that the cutting edge of the tool always insures that that reaction will be along the tangent line, similar to the ideal condition as shown in Fig. 1, isn't that true? A. I think that is correct.

Mr. Farley: I will introduce that sheet as Exhibit 208, please.

The Master: It is admitted.

(The sheet above referred to was marked Exhibit 208.)

The Master: Would you say that with the Walcott machine the tool or the movement of the tool and the work piece was slower as it went around the nose of the cam?

A. Let me explain this, your Honor. We will say that that line there makes the cylinder of that.

The Master: Yes.

A. Now, then, here is the nose, it starts here. Now, this tool is normal to a tangent of that circle.

The Master: Yes.

A. While it is cutting. The circle and the movement, it starts **(138)** to cut up the nose of the cam, then rapidly shoots up that side and it meets that, you see, that nose would be around here. Then when that has swept up that side, then it goes from here around there. What is the arc of the nose of your cam, one-sixteenth?

Q. (By Mr. Farley): One-sixteenth on the Model F. A. Then it goes around from here to here. The point of the tool follows that, and from that point there clean around to here. That tool hasn't any cutting to do except from this point to that point, see? Which is a pretty big section of the rotation of the work, and as it gets down there, that tool is up there, and then it has to rapidly sweep up here. If it didn't go up at terrific speed, this would leave the point of the tool and wouldn't cut at all. It must go up very rapidly from there to get up to that position. First it goes up that way at high speed, and from there around there. That is the rotation of that. It hasn't anything to do except to cut right around here. As soon as it gets down around the extreme nose of the cam, around that little radius there, from then on it has got to sweep up there at a terrific pace to get back to this point again.

Q. Incidentally, there is a backward motion of the tool, as well as an upward motion? A. Yes, surely.

Q. In both machines. Now, Mr. Gordon, in view of your talk about the rapid motions of the tools, if a cam were provided with a mathematically, or as nearly mathematically sharp point on the nose as could be machined, it would mean that the Gordon machine **(139)** in attempting to cut that nose would have to go around the thing instantaneously, wouldn't it, to get the proper cutting angle? A. If you had a knife edge, you mean?

Q. Yes. A. Yes, depending, of course, on what the included angle of the cam nose was.

Q. With the Walcott machine, if the side of the cam, the riser part of the cam, and between the circle and nose, if that were perfectly flat, then the Walcott tool would have to go up there in nothing flat? A. Pretty close to it.

Q. So far as that is concerned, that is a marked difference between these two machines, isn't it? A. In the actual cutting, yes.

Q. Now, you have seen the Walcott machines, have you not? A. I have.

Q. And you are also familiar with this patent number 1,655,655 to Herman W. Melling, granted January 10, 1928? A. Well, I haven't studied the patent. I know the machine quite well, though.

Q. And the structure shown in that patent drawing is a correct representation of the Walcott machines as used by the defendant, is it not? A. As I have seen them, it is, yes.

Q. As a matter of fact, the exhibits filed by the plaintiffs here, request more particulars or interrogatories, I have forgotten just which, showed photostatic copies of the Walcott or Melling drawings as contained on pages 992—they were introduced as Plaintiff's Exhibits B-1, B-2, 993, B-3, 994, B-4, 995. **(140)** They are quite obviously photostatic copies of the drawings of the Melling patent, isn't that true? A. I think they are.

Q. Now, the Melling patent was granted, as shown by the face of the patent, on January 10, 1928? A. Yes, sir.

Mr. Farley: I will ask this be marked, this patent be marked Exhibit 209, please.

(The patent above referred to was marked Exhibit 209.)

Q. And the Gordon patent was granted some time in June of 1925, that is also correct, isn't it, June 16, 1925, Plaintiff's Exhibit 2, shows as being the date of issue? A. Correct.

Q. Now, if you will refer to Exhibit B-2, the one marked Exhibit B-2, and reproduced at page 993 of Volume III, which you will agree is a correct representation of the Walcott machine. Now, that shows, does it not, a work piece to be cut, a camshaft to be cut and represented by the reference character 3 and to which 25′ is directed to the cam? A. Correct.

Q. And the tool is designated by the reference character 18? A. Yes.

Q. And you have a second camshaft which is shown by the reference character 23? A. Yes.

Q. And immediately behind that you have a roller to which the numeral 27 is directed? A. 26, isn't it?

Q. 26—27, apparently. **(141)** A. I see.

The Master: It is 26, isn't it?

Mr. Farley: Yes, 26. Thank you.

Q. Now, those parts are mounted on a reciprocating carriage that travels to and from the axis of rotation of the shaft 23 or 25′? A. That is correct.

Q. That is correct, isn't it? A. Yes.

Q. Now, there is on that reciprocating tool carriage a tool holder pivotally mounted on the carriage and the tool holder is the part having the roller at the end, I think it is designated by the reference character 15, and carries the tool 18? A. Correct.

Q. That is true, isn't it? A. Yes, sir.

Q. And there is in that machine a master cam corresponding to the shape of the work to be cut; that is the part 23, is it not? A. Yes, sir.

Q. Now, there is also an abutment roller co-acting with said master cam for controlling said carriage. The abutment roller is the roller 26 and it controls the carriage. I don't know what the number of that is, probably 11. A. I think that is the carriage, isn't it? Yes.

Q. That is true, isn't it? A. Yes, sir.

Q. Now, the radius of the abutment roller 26 is the same as the radius described by the arc of the cutting tool in this construction, **(142)** that is also true, isn't it? A. Yes, sir.

Q. And that cutting tool and tool holder 15 pivots about the bolt, or whatever it is supposed to be? A. 16.

Q. Is that 16? Then we have got two 16's in there? A. I don't see any other 16.

Q. Yes, 16, that is right. Now, then, there are means for oscillating the tool holder, being the part 21, which co-acts against the roller 20 and oscillates the tool holder 15, that is also correct? A. Together with the spring.

Q. Yes. A. I don't see a number to that.

Q. And this means for oscillating the tool holder, does it so that the point of engagement does it so that the point of the cutting edge of the tool of the work, that is, the point where the cutting edge of the tool engages the work, the cam 25′ corresponds to the point of contact of the abutment roller and the master cam; that would also be true in this machine? A. That is the purpose of the construction, yes, sir.

Q. That means that as the master camshaft 23 rotates the point of contact of the work or of the master cam with the follower roller 26 will travel upwardly as the parts move from the position in which they are shown in this particular Fig. 2 of this sheet 993 of the exhibit book, that is right, isn't it? A. The rotation of the master cam is anticlockwise from this view. I beg your pardon. Clockwise, and that would travel up the **(143)** abutting roller 26 up to the extreme, or not quite to the extreme end.

Q. And as that moves upwardly the tool will likewise move upwardly in synchronism with it? A. Yes, sir.

Mr. Farley: Right there, if your Honor please, I would like to state, for the purpose of the record that I just read to the witness one of the claims of the Melling patent which was granted and which constituted the patentable improvement that the Patent Office recognized in Melling over Gordon, and I could read many more claims here, but I think we can save time if I don't.

Q. (By Mr. Farley): Now, as a result of that movement that I just described, you have the condition of the reaction between the tool and the work being along the normal line such as I have drawn in this Figure 5, isn't that true? A. Its action on the leading side of the cam would be in that direction.

Q. Now, if the action of the tool, reaction of the work against the tool, as I have shown in Fig. 4 would result in the hollow or nick being formed on the leading edge of the cam in the Gordon machine, the difference of the mode of operation in the Walcott machine would avoid that formation of the nick, and to that extent the Walcott machine would be an improvement over Gordon, isn't that true? A. No, it would not. If the same work, that is, if there is any error in the shape produced by the Gordon machine, the same error was in the Melling machine.

(144) Q. We are not assuming any errors in either machine? A. Then they would both make a perfect job.

Q. Now, in the Walcott machine, in the Gordon machine, with this condition, I think you have admitted that considering the tool sweeping through that arc A, your condition of tool to work and reaction between the tool to work parallels the situation shown by the line N′ in Figure 1? A. No, I have denied that very specifically, either N or N′.

Q. You must have inadvertently said yes, then, or I would have followed that further at that time? A. I claim those were incorrect, both of them, both N and N′. At no time do we reach a condition like that in the Gordon machine.

Q. Such as I have sketched up here? A. In N and N′, or whatever Fig. this is.

Q. That is Fig. 1. Exhibit 208, Fig. 1. Then that, of course, depends upon how much the unavoidable error might be in your machine. Is it due to the fact those lines are drawn at a very much greater angle? A. In one position at N, you have a very negative rake to the tool and in N′ you have a positive rake. I would call that a positive rake, because it goes above the center, and this one here points way below the center. Those conditions do not exist in the Gordon machine.

Q. They don't exist at any such angle as I have shown? A. Yes.

Q. They may exist but to a smaller angular variation? A. Yes, sir.

Q. You are not in a position to state now, or do you still testify **(145)** now, that the angular variation such as you showed on the sketches, I think they were MM and NN, is the limit of error that would occur in your machine in

turning the Ford cam? Do you still insist that is the maximum that would be in that machine? A. With that design of cam.

Q. All right.

The Master: Does the Walcott machine eliminate any deviation in the angle of the cutting tool to the work piece?

A. It does, provided that this cam here does not control this cam here. This cam here in contacting this roller here determines the position above or below the center line of the work, and if that cam isn't correct, and the position doesn't, of the tool point, does not correspond to the point of contact between the master and this abutting roller, why then of course you haven't got it—you are not producing a replica of this master.

The Master: Theoretically, you could have, then, with your Walcott machine, an absolutely uniform angle then between the cutting edge of the tool and the work all the way around the cam.

A. Everything would be theoretical to meet those theoretical conditions.

Q. (By Mr. Farley): If those theoretical conditions are met then, Mr. Gordon, the reactive force between the work piece and tool in the Walcott machine is always along a line which is tangent to the work piece at the point of contact? A. Yes, sir.

Q. That is not true in the Gordon machine? **(146)** A. Well, no, it is not in actual practice, because it was not necessary, because the change of the angle of the tool in the Gordon machine does not affect the shape of the work, whereas in the Walcott machine any change in the angle of the tool as it was originally set, does change the shape of the work produced, which is a very, very vital point in that.

Q. Now, then, to the extent of that difference, that particular difference we were just talking about, results from the features of construction of the Walcott machine which I just read to you when I was reading from claim 13 of the Walcott patent, isn't that true? That is, the sweep of the tool, as this says, so that the point of engagement of the cutting edge of the tool with the work corresponds to

the point of contact of the abutment roller and master cam? A. What was the question in relation to that?

Q. That is the feature of construction which insures that in the Walcott machine the point of engagement of the cutting edge of the tool with the work, that is, the tool sweeping up the side of the work, as you described to his Honor, and as shown in these views, Figs. 7 to 11, of sheet 4 of the Walcott patent, that that is the feature of the machine which insures this tangency of operation we were just talking about, provided the master cams are properly designed, no error in them? A. That is correct.

Mr. Farley: How late does everybody wish to work?

Mr. Spohn: Isn't this a pretty good place to stop?

Mr. Farley: I was going to start on another subject.

Mr. Spohn: Are you through with this subject?

(147) Mr. Farley: Practically. I think we can stop here, if your Honor please.

The Master: As far as I am concerned, if you want to go on, it is perfectly all right. It is up to the parties.

Mr. Farley: Perhaps you have some questions at this time yourself.

The Master: I was trying to get some of these mechanical parts in mind.

A. In the first place, your Honor, the diameter of this roll changes, coming in on a path, going through this carriage, the carriage being movable in and out at right angles to the axis of the work. This is stationary in relation to the work. That is, these rotate, they are on center, but the distance between the two is constant.

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(148) Cross Examination (Continued) by Mr. Farley.

Q. When we closed last night, Mr. Gordon, just before the adjournment, you had been speaking of the mechanism in the Melling machine for taking two cuts. As I recall your testimony, I think, I don't know whether it was in the accounting proceedings or before Judge Tuttle, you said at the time Melling was smarter than you in having his ma-

chine so that it could take two cuts. To that extent the Melling machine was an improvement over your machine, wasn't it? A. Yes, sir.

Q. And that in fact is what you did at Nash when you used two machines, one to take a rough cut and the other a finishing cut, or was it at Nash that you used your machine and then the grinding machines for a finishing cut? A. At Nash the grinder was used for a second, what they call a rough grinding operation.

Q. They did the same thing at Studebaker, didn't they, used two Gordon machines, one for a rough cut and the other for a finishing cut? A. Not to my knowledge. They had two machines at the Studebaker, **(149)** at the South Bend plant.

Q. As a matter of fact, they had four machines there, didn't they, four Gordon machines? A. I don't recall just how many they had. I didn't have much to do with the cam machines there. I was more interested in the crank cheeking machines.

Q. Would it be possible to revise or modify your machine so that it could take two cuts? A. Well, I never made a layout of it, but I think that it could.

Q. As a matter of ordinary machine design? A. I think so. As I remember, it comes to me now, we did make a layout of a means of doing that, of accomplishing that. We never built it. I don't know that we ever made completed drawings of it, but I remember what the method was.

Q. Do you remember the discussion we had last night in connection with this Exhibit 208—the reaction that would occur with the cam swinging down on the tool as I have shown in that Fig. 4 and the reaction being along the arc. Would you know how to prevent that from happening in your machine? A. I don't think that I admitted it would have that reaction. As I remember, my testimony was that it was a combination of two directions of force that did the cutting at that point, one in the direction of the rotation of the work and the other of the drawing of the tool towards the point.

Q. Well, the greater force that would be exerted here would be the force exerted by the rotation of the work shaft downwardly on the point of the tool, that would be a greater force than the movement of the tool in the horizontal path backwardly under the influence **(150)** of the

cam 43, wouldn't it? A. No, I hardly think it would at that point. You couldn't have one without the other, I don't believe.

Q. In the Melling machine, however, the action of the tool and the work cutting up along the side of the cam was such that the movement of the tool had a very much greater effect in producing the cutting action than in the Gordon machine, isn't that true? A. Only in a sense. They both have to cut, cover the same surface about the nose, and in each case that cut is controlled by the movement of the point of the tool.

The Master: Will you read that question?

(Question read by the reporter.)

Q. When you were explaining to the Master yesterday afternoon you said that in the Melling machine the tools swept up the side very rapidly and that did not occur in your machine, that is true, isn't it? A. Yes, sir, that is true.

Q. And the rapid upward sweeping of the tool in the Melling machine was along the line, a tangent line such as I sketch in Fig. 5 and mark with the letter S, and in that case the relative movement between the point of the tool and the work was produced largely by the upward swinging of the tool, isn't that correct? A. I think that you are correct in that, but in that connection I would like to say that the point of the tool covered the same distance in making that cut on one machine as it did on the other, but in the Melling machine the time required to make, the time required to travel from the base of the nose to the point of the nose was much less in one case, that is, in the (151) case of the Melling than it was in the Gordon.

Q. Yes. When you say the point of the tool covered the same distance, what you really mean there is that the point of the tool in both machines swept around, or cut the same part of the cam, that is really what you mean, isn't it? A. Covers the identical length of cut or movement of the tool point.

Q. Yes. A. What the tool point in one case covers it also covers in the other case. They are both producing the same form.

Q. Yes. A. But the speed at which they cut, that varies on the two machines at different points.

Q. They both cover the same surface or contour of the cam? A. That is correct.

The Master: Was the speed of the cut of the tool in your machine around the cam approximately uniform, or did it vary considerable as it went around?

A. The cut around the point of the cam?

The Master: The speed of the cut around the cam, as it was cutting the cam, was that approximately uniform all the way around with your machine?

A. It was uniform except to the extent that the cut is more rapid as you reach a greater diameter.

That is, if this were a 100 per cent diameter base line and you are moving out to a 2-inch diameter base line with the same number of revolutions per minute, why you are going to pass, the tool is going to pass through the material at a greater speed when it gets further away from the axis of rotation.

* * * * * *

(152) Q. (By Mr. Farley): I think I see what you have in mind. In the case of your machine the cutting action—we went over this before, but let us assume that the eccentricity of the nose is 3/8 of an inch. Suppose you have a base circle 3/8 of an inch. In that case, in the case of the Gordon machine, your tool is moving along the horizontal line between cam 43 and swinging on this shaft 24. The tool is moved 3/8 of an inch during the time the cam is rotating from this point, the point at the end of the base circle, to the exact nose of the cam, that is true, isn't it? That is the distance you must swing your tool backwardly to bring the point of the tool out the required distance from the center? A. Yes, sir.

Q. And during that time, however, the work is rotating quite rapidly? A. Constant speed.

Q. As your tool moves out beyond the base circle the cutting speed at each instance increases progressively from the base circle out to the nose of the cam? A. The cutting speed increases.

Q. That is right. A. That is correct.

Q. And the maximum cutting speed is exactly at the nose of the cam? A. Yes, sir; the greatest distance from the center of rotation.

Mr. Farley: Is that what you had in mind?

The Master: Yes. With the Melling machine, on the other hand, you had a much greater speed.

A. Accelerated speed.

The Master: At a certain point.

A. Yes, very materially accelerated speed, but the diameter on **(153)** which you are cutting in the Gordon machine is what controls the speed of the cutting, which is not true in the Melling.

Q. (By Mr. Farley): I think you already pointed out to the Master that the nose of the cam is the hardest point to cut; that in the Melling machine the tool moves upwardly somewhat rapidly until it reaches the nose and then during the cutting of the nose the relative movement between the nose and the point of the tool is comparatively slow? A. I didn't make any such statement as that to the Master or to anyone else at any time, because it is not true.

Mr. Farley: Will you read my question, please?

(Question read by the reporter.)

A. That first part of it is the part I object to.

The Master: Will you explain what you were going to say there? I would like to know what he was about to explain on that statement.

A. If this were a cylinder, and this diameter, the diameter at the end of the nose, it wouldn't make any difference there about the cutting speed. Now, that is the condition that obtains in the Gordon machine.

Now, the reason why they are so long in cutting about the nose of the cam in the Melling machine is because they whip the tool up to the point and then just follow it down around here and during that much of the rotation of the work they do very, very little work.

The total time consumed in turning all the way around there is divided up into, we might say, three periods. When you are working around the base that doesn't change. It is constant all the way around.

(154) When you start to go up here in the Melling machine it whips up there very rapidly and then as it reaches the point of the nose it slows down, while that

travels 'way around, approximately to that point, and all it is doing during that time is cutting from there to there, but that doesn't mean they are doing that, because it is a difficult thing to do. They are doing it because they can't avoid doing it. There is no way in which they can speed this up here and carry a similar speed around the nose, because if they did they would be shortening the total time and they can't do that. If there are 60 revolutions a minute it takes one second to go all the way around. They have got to use that entire time somewhere. It certainly changes the speed going around there. They are longer at one point and shorter at the other. It is not because one part is more difficult to cut than the other. We do not at any time in the Gordon machine, we do not at any time exceed the speed of cutting equal to the rotation of the work, whereas in the Melling machine they exceed that in two cases, and that degree is very, very material in one case.

The Master: Is the cutting tool worn out much faster by rapid acceleration at one point and decreased acceleration at the other?

A. The life of the cutting tool is dependent upon the speed of the cut.

Q. Let me ask you this: Do you know in either the Gordon tool, or Gordon machine, rather, or the Walcott machine, was it possible to rotate the work so that the linear cutting speed would be the maximum cutting speed for normal upkeep of the **(155)** tools, isn't that true? A. To a large extent it is true. However—

Q. All right. A. May I finish?

Q. Yes, that is all right. Excuse me. A. However, if you run that tool, we will say a tool that is quite capable under ordinary conditions of carrying a cutting speed of 150 feet a minute, which is not unusual at all, if you reduce that to 50 feet or one-third of that speed, your tool would wear out, but it wouldn't wear out as quickly. That is all the difference. There is a wearing out and that wearing out is very material even on slow cutting.

Q. One of the reasons why it is not possible to run either of those machines up to maximum cutting speed is

because of the difficulty in having the tilting tool mechanism following the tilting tool cam? A. Yes, sir.

Q. Now, on this proposition which you so violently disagreed with me, that the nose of the cam is the most difficult point to cut, suppose we increase the area under consideration being cut, not restricting it to the exact nose or sharp point of the cam, but including, let us say, oh, an area we will say ⅜ of an inch along the side edge of the cams in each direction from the nose. If we make that as the portion as being the most difficult to cut, would you agree with it? A. No. If I understand the question right it wouldn't make any difference under normal cutting conditions where you cut, as long as you maintain the proper tool angle and tool clearance.

Q. Then your answer assumes that in the cutting of that particular portion of the contour of the cam to which I referred that you **(156)** are going to have the ideal conditions existing, is that true, tool maintained normal at proper cutting angle and clearance? A. You are speaking now of the Gordon machine?

Q. Yes, let us limit it to that. A. We are assuming that the tool is going to be in the proper cutting position at all times.

Q. And if you can't hold the tool in the proper cutting condition during the cutting action at that portion of the contour, you will run into difficulties, or you are likely to run into difficulties, that is correct, isn't it? A. That depends entirely to the extent that you depart from what you might call an ideal cutting angle.

Q. Do you have any opinion as to how far that departure from the ideal may be before you would run into difficulties? Would you hazard an opinion on that? A. Well, I would like to express an opinion on that if I could make up my mind that my answer would be understood, because I think that we are looking at it in two different manners.

In the cutting tool of the Gordon machine the angle of the cutting edge of the tool does not vary at any time at any point while it is going around the cam with reference to the metal that is being removed, that is, the surplus metal.

The thing that does change is the angle or the tangent at the point of cutting to the point of the tool, which is not doing the cutting. I say that while—

The Master: For that first angle you speak of what line do you use as the other line or angle? You say that you have a constant angle.

A. Could I make a mark on this?

(157) The Master: Here, take another sheet of paper.

A. Looking at the tool we will say here is the cam. Now, this we will call that the center line of the work. Now, the tool is in here and that tool is positioned something like that.

Now, looking at it from the—that is, looking down on the top of the tool, and the cut is removing this metal back there, see?

Now, it is the relation of the tool to this that makes the cut.

Now, looking at it from the other side we have the tool here. It is this angle here in relation to the face of the material that is being removed that is constant at all times. There is not any movement that is going to change that angle.

That is, that cut is going to be the same right from the beginning and all the way around to the material that it is removing.

Now, the angle at all times, the metal that it is taking —in the Gordon machine we have a circular tool like that. Now, this angle here in relation to the surface of the finished material, that does change and can change and make no change whatever in this cutting angle, excepting as it might cut, the cut might be in that direction or it might be in this direction, or it might be in this direction. That is the face of the cutting edge of the tool in relation to the finished work.

The Master: This first angle you are speaking of, is that the angle formed by the side of the tool and work that is being removed?

A. I was going to bring you a piece of a shaft showing the cut. I **(158)** haven't got that here. I guess that

is over at the hotel. This angle here is the angle that might be pictured with that knife blade. No matter where that goes around the edge—

Q. Maybe this will help. A. You see, this angle here changes, the clearance angle from the cutting edge below it, that must have a clearance so that it does not interfere with the work.

Q. That is the side cutting edge of the tool you have been referring to on physical Exhibit 58-A that was introduced at the hearing before Judge Tuttle, and that is a tool-holder from a Gordon machine, is that correct? A. Yes, sir. I don't think that is a tool-holder from a machine that was made for Ford as my memory serves me.

Q. I think you are right. A. I don't remember it in connection with that, anyway. But this angle here, we will take that that way. That angle there might change. See, that would be this line here.

Q. Might I suggest something? You say this angle here. Would you please say, I am referring to the front angle, if that is what you mean, front angle of the tool and not the side edge. A. I am referring to the line designated as A on this sketch.

Q. Now, will you mark that sketch Fig. 1. Suppose you mark the other one Fig. 1 and make this one over here to the right Fig. 1 and that one Fig. 2. A. All right. I am holding the cutting tool in this Exhibit 58-A parallel to the line designated as Exhibit—designated as A in Fig. 2, and you will see that that angle is different from either a normal to the tangent, which would be there.

(159) Q. Suppose you draw a line at the point where you said "there," mark it "N" for "normal." Would you mind stating now that you have drawn a line there? A. I have drawn a line which would be practically—

Q. Normal? A. At right angles or normal to a tangent at the point of contact with the finished surface of the work.

Q. And you have marked that line N? A. And I have marked that line N.

Q. Thank you. A. Now, I am holding the tool now parallel with the line B, Fig. 2, and it shows an angle to the normal or to the tangent, which we would call a negative angle.

The Master: That is, angle to the tangent than to the normal, you mean? You said an angle to the normal or to the tangent.

A. Yes, this would be the normal and at a tangent it would depart from a right angle.

Q. Which one of the lines there are you referring to as being the negative angle? A. That one marked B.

The Master: The angle formed by B and a tangent to the finished part of the work.

A. Yes. And when it conforms or is parallel to the line marked A it would be what we would call a positive angle. Now, in neither case does that change the cutting angle of the tool with reference to the material being removed.

The Master: You mean the angle formed by the side of the tool is constant all the way around?

A. And the top of the tool, that is, this being the top of the **(160)** tool, and this being the side of the tool.

Q. (By Mr. Farley): I am wondering whether you haven't inadvertently, Mr. Gordon, referred to the line—oh, I see, you have got your work rotating in this direction. A. Clockwise.

Q. Isn't that going to be confusing, showing your tool over here on this side? A. I am afraid it would. Yes, this tool, the work should be rotated in that direction.

Q. Then if the work is rotating in that direction, then your line represented by the line B would be a positive angle and not a negative angle, isn't that true? If your work is rotating in this direction, hadn't you better put the arrow the other way around?

The Master: Rotating counter-clockwise, you mean?

Q. Yes. Now, with the work rotating in the counter-clockwise direction as you show by the arrow, the line B, then it would be— A. (Interposing): Would be a positive angle.

Q. Rather than a negative? A. And the line A would be the negative angle.

The Master: You better have this marked as an exhibit so that the record will be clear on that point.

Mr. Farley: Let us make it Exhibit 210, I think.

(The paper above-referred to was marked Exhibit 210.)

The Master: I will admit Exhibit 210 into evidence.

Q. (By Mr. Farley): Well, now, Mr. Gordon, I gather from your explanation that you want to have the Court understand that it is the side portion of the tool and side cutting angle which **(161)** is of the greater importance in so far as the Gordon invention is concerned, is that correct? A. That is correct.

Q. Are you taking into consideration when you state that the fact that your patent states that the main object of the invention is to maintain the cutting tool in the proper cutting and clearance angles to the work by varying the angle of the tool relative to its support and the work while the cutting is being done? There is not, and never was anything in the Gordon patent or in the Melling machines to vary that side cutting angle that you are now talking about, isn't that true? A. Not during the operation of the machine, that is correct.

Q. And as a matter of fact, the gist of the whole Gordon invention is that of varying the other cutting angle, the angle of the top of the tool, the top cutting edge of a side here relative to the point of contact of the point of that side cutting edge with the work; that is the principal object? A. And to maintain a proper clearance angle.

Q. Yes. A. If that were not done, if the tool were not rocked, why it would not be a very practical tool.

Q. But it all has reference to not the side cutting edge, the entire Gordon invention has reference not to the side cutting edge, but to that front part of the tool and the variation of the top of the side cutting edge from any angle except the normal angle to the work at the point where the point of the tool is cutting, isn't that correct? A. That is very largely true, yes.

Q. Now, let us consider again this area of the cam, as I stated, **(162)** let us say about ⅜ of an inch from the nose of the cam down along each side and including the nose.

Mr. Herklotz testified that in the attempt of the Ford Company to use the Gordon machine the tool made a hollow or a gouge in one side of the work and a hump on the other side, the gouge being there, and I will take the liberty of sketching on this Fig. 2 of Exhibit 210 a small dotted line on the left side of the cam and a similar dotted line on the right side of the cam. I will mark the first one "H" to indicate hollow, and I will mark—wait a minute. Strike that. I will mark the one on the left side "G" to indicate a gouge or hollow, and I will mark the one on the right side of the cam "H" to indicate a hump.

Now, you also admitted that you did have that experience at the Ford plant of some of the cams having a hollow and some having a hump on the other side.

Now, it is true, isn't it, that you did have that experience with your machine, of the formation of a hollow on the approaching side and a hump on the far side? A. It had an appearance of it.

Q. Well now, can't you answer that question "yes" or "no"? A. No, I can't, because it is necessary to explain.

Q. Answer it first and then you can explain. Say whether you had that experience. A. Yes, sir; we did have, and an explanation of what that was, the contour of the cam, gouge there of the finished cam, that is, the ground cam, or if there was no action that made the work depart from the position that it was supposed to be held by the steady rest, that shaft might have jumped into the (163) tool and made a hollow or there happened to be a hollow there on the other side. It might have been free to go away from the tool and put, make a hump, but in the construction of the Gordon machine there was not anything that would permit a hump, because there is no spring action or anything else. It is a positive cam action on the trailing side of the cam.

Now, on the leading side of the cam the tool is controlled by a spring holding the swinging arm up against the master cam, and if the spring didn't hold it up there, then the tool would cut below the surface that it was intended to cut on, but what I have maintained right along is that it was the gouge and the hump were due to the movement of the work in the steady rest, the freedom there in

the steady rest, or to the spring that was due to a heavy cut at the point of flash on the cams that affected the otner shapes, that is, it moved the shaft and of course the ones adjacent or nearer the cam where the excessive metal was on would show the result of a shaft movement that was outside of the orbit in which it was supposed to travel.

Q. Let me ask you this, Mr. Gordon. Assume that no one prior to yesterday ever called to your attention that as your tool in the Gordon machine is approaching the spot marked "G," or let me put it this way, as the tool is at the point where I have marked "P" there in my Fig. 4 of Exhibit 208, no one had ever called to your attention before the fact that your work was sweeping rapidly down on the tool at that point, and that your principal component of force there, giving the reaction between the tool and the work, was on the curved line which I have marked A, was that ever called to your attention before? **(164)** A. Surely. That is in the general principle of operation. You have got two forces and the component of those two forces—

Q. Well, would you say that the fact that your principal reaction between the tool and the work along this line which I have marked A would have no contributing cause at all to the formation of a gouge as I have checked in Fig. 2 of Exhibit 210? A. Yes, sir; I would state that it had no effect on that.

Q. I thought you stated on several occasions that you didn't consider the principal reaction to be along A there? A. I don't consider it, but you are asking a question, does that line that you have drawn, marked A there, it certainly doesn't. That is not the condition. I think I understand what you are getting to and I was trying to give you an answer as I understood what you wanted.

The piece of work is rotating anti-clockwise in this sketch, Exhibit 208, Fig. 4. It is against the tool. There isn't any reason why this is going to go ahead of the power that drives it.

Q. That is just it, Mr. Gordon. The entire cutting force there or certainly the predominant cutting force comes from the rotation of the work in your machine as shown in this view, isn't that true? A. No.

Q. Suppose you didn't rotate the work, could you do the cutting? A. Absolutely.

Q. You could? A. If you didn't rotate—you wouldn't get that form if you didn't do that, but if you pull the tool in that direction, which is one of the directions of the cutting, you certainly **(165)** would cut.

Q. Where are you going to start your tool to do that cutting? A. I am not saying you are going to get this force. It is the component of those two forces. One force is to pull the tool out and it has got the other when you pull that tool away from the axis of the work, and it has got that cut from the other force which tends to rotate the work.

The Master: Could you determine mathematically which of those forces was the principal force?

A. It might be done.

Mr. Farley: We have here, if your Honor please, a plate model of the Gordon machine.

* * * * *

A. Now, while you are turning that, your Honor, you can see what I am trying to explain. At this point here there is no **(166)** movement towards or away from the center of rotation, when it is going around the base line of the cam, but when it goes around here as soon as it strikes the base of the nose it starts to pull that way. This member here starts to swing in under the control of a spring or rubber. Here is the spring here that holds that up against the cam, and that is this cam here.

Q. That is marked the spring 49? A. The spring is 49.

Q. Spring 49 of the patent.

Mr. Spohn: The cam, he is talking about.

Mr. Farley: 43 is the one behind.

The Master: Do these numbers correspond to the numbers in the patent?

Mr. Farley: Yes, sir.

A. Now, when this member here swings away from the axis of rotation it certainly has a cutting effect. If you were to stop the rotation of this member 18, the work member, stop the rotation of that right there, but continue the rotation of the cams, and this would follow the cam—

Q. You would pull the tool out away from the work? A. You would pull the tool along the face of the metal to be

removed and you would depart, of course, from the desired shape of the work, but you would still be cutting.

Q. Just let me ask you before you get off that, Mr. Gordon. As I understand you, you are going to hold this work stationary at this point. You said if you stopped the rotation of the work at this point, that was your testimony, wasn't it, **(167)** you are going to stop the rotation of the work, but you are going to continue the action of the cam to pull this tool to the left? A. To make it more plain—I didn't have it in that position. Let me put it in the position where I had it when I was trying to show you.

Q. It is much clearer if you put it there.

The Master: By "there," you mean it is where?

A. On the leading side, about mid-way between the base circle and the nose of the cam.

Q. All right. A. It is very much easier to recognize what I was getting at.

Q. At that point you are going to stop the rotation of the cam, that is the idea, isn't it? I want to be sure we understand one another. You are going to stop your rotation of your work. A. I said if you stop the rotation of the work and continued the movement of this member 23 in swinging away you would carry that cut from the point where this stopped right out to the outside of the rough forging, and it would be cutting all the way.

Q. You are coming to the point where the cam, the back cam 43 is going to move the part 23, as viewed from the front, towards the left, and that if your work does no more rotation that is going to take your point of the tool straight over towards the left in a substantially horizontal line, and make it depart immediately from the point where it was cutting before, isn't that true? A. No, sir.

The Master: Isn't the motion of that big member horizontal?

A. This member?

(168) The Master: Yes.

A. Member 23?

The Master: Yes.

A. Your Honor, let me show with this illustration here on Exhibit 210, Fig. 2. Now, there is the axis of the

work, and here is the line. Do you want to give this any particular number, Mr. Farley? I am showing a radial line from the center of the rotation of the work.

Q. Let us mark it "R." A. If that tool were pulled out—it was at this point.

Q. "This" point, mark that "P," then. A. On "R."

Q. Before we go any further with that, Mr. Gordon, because this is going to make the record very confused, let me go into this matter. In your Fig. 2 you have shown a tool which I have marked "T" over here, that is correct, isn't it? A. Yes.

Q. And in accordance with your machine, and you have drawn that point of that tool substantially on a line which passes through the center of rotation of the work piece. Now, in your machine any movement of that tool under the influence of this cam 43, and the movement you have just been talking about, and the movement you are laying so much stress upon as having a cutting action additional to the rotation of the work, is going to be a movement in a horizontal line drawn through the point of the tool backward and forward substantially parallel to the top of the paper and not a movement along this line which you have drawn "R," isn't that true? **(169)** A. No, sir.

Q. Can you explain to me how in the Gordon machine, with this mechanism mounted as it is, with your tool mounted to swing on the axis of the shaft 24 it would be in any way possible to get a movement of the point of that tool up on that line marked "R." Let me show you here. There is the movement of that point of the tool, is in and out on that line, substantially horizontal there, isn't it; isn't that correct? A. Yes, practically, traveling in a horizontal direction, but you haven't pictured anything like what I am talking about.

Q. You are talking about the fact that that doesn't apply at all to the machine? A. That is what you think, but I think I will be able to show it does apply.

Q. All right, go ahead. You are going to make the machine do some tricks I never thought it capable of. A. It is not timed right. This line here and this one here are supposed—

The Master: Mark the gears.

A. Now, the metal to be removed from the work piece, No. 18, I will exaggerate and say that it sticks out there a quarter of an inch, just so as to make the picture plain. That is, it would come around about like that, follow that line that I marked 34.

With that movement in that direction, away from the axis of rotation of the work, that tool is set at an angle, and it is going to drag through there from that point to that point, isn't it, on a line horizontal, and that is the cutting **(170)** that I am talking about.

It is going to cut, but it is not going to continue following the contour that we are desiring to make on the work, but it is going to cut until it has passed outside the range of material that is there to be cut.

The Master: It will cut off sort of a small diamond-shaped piece there?

A. Correct. That is all I am trying to explain. Now, that is the power required to do that, together with the power to rotate the work. The component of those two are the direction of power applied.

Now, while this is rotating we still have to the full extent the power required to pull that tool out towards the end of the work.

Q. Now, what power is there in the Gordon machine that would permit the machine to accomplish that cutting you are now talking about? The only power there is is the action of the small spring 49. A. What do you mean by small spring?

Q. The springs such as shown in your patent. I don't mean to say this spring corresponds to the other. A. That spring is developed to where we felt that it was sufficient to do the work, and it did do the work. It took care of millions of shafts.

Q. If you eliminate the rotation of the work, Mr. Gordon, you wouldn't get very much effect of cutting? A. You certainly would. You would finish, you would finish the cut that the tool was in. We will say the tool is in this **(171)** material here to the extent we will say of five-thousandths of an inch. That is the thickness of cut that it is taking. You are making a chip and that chip is five-thousandths of an inch thick. That is what it would do without the rotation of the work and the swinging movement of member 23.

Now, if you stop the rotation you are not going to make the cut any thinner, the chip any thinner. You are going to continue the same thickness until it departs from the work altogether.

Q. Let us be sensible about this thing, Mr. Gordon. A. You are speaking about me?

Q. Yes, sir. A. All right, you go to it.

The Master: This is sort of off the point. How many revolutions of the cam is ordinarily made in completely turning the cam?

A. That varies, of course, with the diameter of the work and the hardness of the steel.

The Master: I was trying to get a general idea.

A. Anywhere from 200 to 250 revolutions per minute. It might be less than that; very seldom any more than that.

The Master: Go ahead.

Q. (By Mr. Farley): You will admit, won't you, that the principal characteristic of a lathe, and before that, the Gordon machine is a lathe, isn't it? A. Yes, sir; we consider it a lathe.

Q. And it works on the lathe principle? A. Yes, sir; but that it departs from the usual lathe practice in that swinging of the tool to and from the axis of the (172) rotating work.

Q. The swinging of the tool to and from the work doesn't in any way change the character of the machine as being a lathe? A. I wouldn't say so, no.

Q. Your principal characteristic of a lathe is that the cutting action is performed by the rotation of the work against the tool? A. Ordinarily that is correct.

Q. And isn't that also correct in the Gordon machine? A. It is true, except when you are cutting around the nose of the cam. I have been trying to explain that there is a different movement there.

Q. Oh, yes, we will admit that there is. A. What that ratio is between the two powers applied is something else. I don't know what that is.

Q. I think you put your finger on the nub of the entire situation and talk we have been having. The ratio between the power to rotate the work, and cause that great force

that is required to tear loose the excess material to be removed, that unquestionably a greater part of that force comes almost entirely from the rotation of the work and not by the action of the spring. Now, it is true, I will admit there is a slight component due to the back and forward motion of the tool along the horizontal line between cam 43, but I think you will admit that if you eliminate the rotation of the work you wouldn't have very effective cutting. Aren't you willing to agree to that? A. No, sir.

(173) Q. Very well. Eliminate the rotation of the work instead of the movement of the tool. You will still say if you eliminate the rotation of the work in the Gordon machine you would still have an effective cutting machine to do the job that is supposed to be done? A. If that were true I wouldn't have had to build a machine that rotated the work.

Q. That is right. A. But the same cut that is being taken during the rotation of the work, the same amount of work or power necessary to make that cut has got to be continued until that tool has finished the cut, diminishing, of course, as it gets nearer the outside diameter of the work, but it took certain power to bring the cut around to that point, around to this point here. Now then, it goes from that point there, it goes out in that direction. When it starts with the rotation it starts where the other cut leaves off and then it has just as much power to continue that, excepting that it diminishes until it gets out to nothing.

Q. Now, Mr. Gordon, did you know anything about the machine, the Gordon machine that was sold to the Jackson Shaper Company, or the Jackson Motor Shaft Company, or some such name as that. You had a machine up there at Jackson, didn't you? A. I think we had two machines, if I remember right.

Q. Didn't they have the same difficulty with respect to hollows and humps on the cams as the Ford Company experienced? A. On certain cams.

Q. Yes. And didn't you have the same sort of difficulty with **(174)** your machine at International Harvester? A. I never saw the machine at International Harvester and couldn't get information from the International Harvester Company people. I probably could have.

Q. You were not sufficiently interested in the International Harvester machine to check on it? A. Well, I was pretty busy. I was making a living outside of that at the same time, but I would like to state that we had the same flash trouble at this Jackson,—I think Jackson Motor Shaft Company plant, along with numerous other difficulties, which we protested against very much, and that was that they put our machine to work right in the middle of all of their rough grinders and emery wheels, and stuff got on our machine from the rough grinders. We told them that we couldn't continue unless they gave us the machine in a proper location, in a location that was clean.

Q. The experience then of the Ford Company was not unique in that respect; other companies had the same difficulty of humps and hollows. Let me ask you if you know how to modify or revise your machine to correct that trouble. Did you ever find that out? A. We did not only modify the machine, but we put the work in such condition so that it would fit a steady rest and couldn't float around like it did at the Ford plant.

Q. Then would it be your position that either could be done, you could either change the machine or modify the work to overcome the difficulties? A. Surely. It has been done.

The Master: Is it your opinion that with the Melling **(175)** machine the only way they got away from that difficulty was by making a duplicate cut?

A. Absolutely. They removed all those variations, all variations in the amount of material to be removed to a very slight degree by that first cut, so that on the second cut they had a very light cut and the metal was practically uniform all the way around, and there was no great amount of movement of the work.

The Master: While you were observing the Melling machine at the Ford plant did you see them attempt at any time to remove all of the metal with one cut?

A. No, sir. I don't think they did. I never heard of a Melling machine that made any attempt to do that. One of the features of the machine was that they would give it two cuts.

The Master: In the Melling machine did they cut it all the way around to the size to eliminate the major part of the metal, the flash and so forth, and then start over again and cut it at the smaller size, or did they make one revolution?

A. Your Honor, they passed entirely across the cam with the cutting tool, and they left it over-size. In other words, if this were the finished size of the cam, they cut it down the first time to about there all the way around, and then the work passed back to where the tool was in the starting position again with reference to the cam, and then the work was moved in so that the tool on the second cut cut it down to this line which I have shown on Fig. 1.

The Master: Pardon me for interrupting, Mr. Farley.

(176) Mr. Farley: That is all right.

Q. (By Mr. Farley): Mr. Gordon, assuming that my theory with respect to Fig. 4 of Exhibit 208, of there being a large component of the reaction to cause the cutting, being due to the rotation of the work against the tool, and that that reaction is directed along the line, or rather that the work is moving along the arc A, and that the reaction is along the dotted line which I have marked D, would that sort of a condition be more acute with a sharp-nosed cam, such as the Fordson F-446 cam, which you attempted to cut on the Gordon lathe; would it be greater with a cam of that kind than it would be with a cam of the type that was used by the Nash Company as shown in this Exhibit 205?

And I will let you look at the drawing of the Fordson F-446 cam, which is attached as Exhibit 3 to the Defendant's statement of account. Perhaps it would be simpler instead of using this to refer to your ten times enlargement of the Ford cam, because that compares very favorably with the size of the Nash drawing. A. Now, if I understand your question I can explain it this way: If this Nash cam, Exhibit 205, at any point around the base circle of that cam the direction of force is constant, and as soon as you start to depart from that cylindrical shape then you have got to have some other element that is going to require power to pull the tool in another direction.

Now, on the Ford cam—do you want to use any exhibit number?

Q. That is your Exhibit NN, I think. NN. **(177)** A. On this enlarged drawing of the Ford cam, Exhibit NN, is a sharper nosed cam than on the Nash. Therefore you are going to require more power to do your cutting as the tool is dragged out towards the nose of the cam, and if you were to have one twice as high as that mounted on the same diameter base circle, you would require still more power, and the nearer you get to a cylinder the less power is required, in fact, until on a direct cylinder there is no power required, except the power required to rotate the work. As soon as you start adding the nose or the tool, it must be carried in any direction away from the center of rotation, then you need power to pull that tool there.

Now the component of the rotating power and the power required to move the tool out towards the nose of the cam, that is the power required to move the work.

Q. That isn't really an answer to my question, Mr. Gordon. As I understand it, that explanation you just gave there involves the distance you have to move your tool outwardly due to the lift of the cam. That is the follow-out, as I understand your testimony, the follow-out from the base circle due to the lift of the cam here, and you have to pull your tool, and more power is going to be required to pull it out, is that the gist of what you were saying? A. Yes, sir.

Q. Well now, what would you say, that that would be greater on the Ford cam than it would on the Nash? A. I think it would.

Q. I am calling to your attention the fact of the drawing of the **(178)** Nash cam shows the distance from the center to the top of the cam as 1.0445 inches, whereas in the Fordson cam the distance from the center of the cam to the point is given as .964. So in that respect the Fordson cam would take less power to move it out? A. No. No, you haven't told the story.

Q. Well, probably I didn't understand your testimony correctly then. A. I said relative to the base circle, the amount of lift from the base circle.

Q. Oh, I see. A. That is the principal thing. Now, we have other things there in connection with that, which

as I referred to, the angle of that nose, and that is quite material.

Q. Yes. The Nash cam has a larger base circle by two one-hundredths of an inch than the Ford cam, fifteen one-hundredths of an inch, approximately, and there is a difference of probably fifteen one-hundredths of an inch between the amount of lift between the cams, and so they practically balance I would say, in that respect? A. Excepting for the shape of the nose.

Q. Yes. Well now, the point I am getting at is if you assume your various positions of the tool as shown in your Exhibit NN, a greater degree of movement of the tool in your machine for the Ford cams, a very much faster movement will be required around the nose of the cam than would be required with this long sweeping radius of the Nash cam, that is true, isn't it? A. That is correct, due to the shape, the difference in shape of **(179)** the nose. One has a very blunt nose and a wide angle between the sides, and the other has a comparatively narrow angle between sides, which makes a small nose.

Q. And you encountered greater difficulties in your machine in cutting the sharper nosed cam over the blunt nosed cam? A. No, not due to that.

Q. Due to what then; due to the machine? A. No, due to the fact I have been trying to explain in reference to the flash and irregularities of the amount of material to be removed.

* * * * *

(180) The Master: I would like to ask in connection with that line of questioning that was just completed by Mr. Farley, if you had the same amount of flash with a blunt-nosed cam of **(181)** the Nash type, would you have the same difficulty of gouging one side and a hump on the other?

A. Your Honor, if the cam shaft, that is, the work, was not held securely in the means provided, which we call the steady rest, if that steady rest did not control the position of the work, why any irregularity like that of course would make it move about and it would be reflected on pretty near every cam on the shaft, not only the one that had the flash, but on the other cams also.

The Master: The flash, as I understand it, is usually right at the point.

A. No.

The Master: It is not?

A. No, the flash on pretty near all the cams is near the point, on one or two cams, but it is also directly opposite it.

In other words, as shown here, the flash might be up here on the point or on the extreme nose of the cam, as shown here, Fig. 2, Exhibit 210, but there also is one directly opposite that, because the die is made in two pieces put together, and they throw a flash in both directions. It is the excess metal that is put in between the dies that must work out somewhere, and it squirts out between the two dies, and that forms the flash which usually is trimmed off.

The Master: Can you say from your knowledge of forging whether you are more likely to have a flash with the sharp-nosed cam than with the blunt-nosed cam, or if there is any relationship?

A. No, the amount of flash is dependent upon the condition of the **(182)** dies and the amount of surplus material that is originally put between the dies.

If the dies are worn there is not as much metal squirts out to make a flash. When the dies are new there is more metal squirted out from between the dies, but the dies are in such condition that they cut it down very thin.

Q. Probably it would help you if you would point out to the flash on Defendant's Exhibit 28, which is a forging of the Model A cam shaft. A. All right. Now, this part of two dies is shown quite distinctly at the end of that Exhibit 28, Defendant's Exhibit 28, and that is carried along the full length of the die, clean up to the other end.

Now, at this point the flash is moved over off the straight line because they have changed the surface of the forging die.

In other words, they have dropped down a little bit there and they have had to build the other die up to meet that, but it is pretty near the same all the way along.

Here on the second cam it is almost at right angles to the nose.

The Master: There is no relationship in this between the nose and the flash?

A. No. Over here the flash was directly opposite the nose, so it varies all along the line.

You have got all kinds of conditions there, and it might be that it is desirable in making up forging dies to have the flash slightly to one side.

(183) In this particular case they have overcome a difficulty there by changing the parting line of the dies on this cam, the first cam from the flange end, but the rest of it apparently is all on the one line all the way through, but in this particular one they have moved that over and had to build up the corresponding die to make up that difference.

So you see the flash really hasn't anything to do with the nose of the cam, only that it is convenient to make it near the nose of the cam of a four-cylinder shaft, of two of the cams, but they are the only two there where you have that condition.

In this one here you have it very close to the nose. Is that clear?

The Master: Yes, that explains it.

Q. (By Mr. Farley): Mr. Gordon, I hand you a blue-print of the cam which was introduced in evidence as Exhibit MM during the hearings at Milwaukee, and that is a blue-print of the drawing that you produced up there, is it not? This is a copy that was furnished us.

* * * * *

(184) A. There is no question but what it is a duplicate of the original.

Mr. Farley: Please mark that Exhibit 211.

(Document marked Exhibit No. 211.)

Q. I hand you a celluloid, we will call it celluloid, at any rate, semi-transparent paper, which is marked "Tractor Cam," and has just been marked by the reporter Exhibit 211, and I will ask you to place that upon the drawing Exhibit MM, and state whether or not the Exhibit 211 conforms exactly to the contour shown on your cam drawing Exhibit NN? A. It is very close there in contour to the figure shown on Exhibit MM.

Q. It is not only very close in contour, but it also coincides exactly as to size, does it not? A. Very closely, yes, sir.

Q. You are not able to detect any variances, are you, Mr. Gordon? A. Well, I would expect there would be a variance, because this is a blue-print and usually they shrink or stretch away from the original drawing dimensions. That is why we put dimensions on so that we don't use any dimensions that are taken off the drawings by measurement.

We always conform to the dimensions stated on the drawing.

Q. Well now, if that Exhibit 211 were prepared by the use of the dimensions given on the drawing Exhibit MM, you would agree that that would be a correct representation of the cam you depicted in that exhibit, would you not? A. Yes, sir.

(185) Mr. Farley: Very well. Will you mark this Exhibit 212.

(Paper marked Exhibit No. 212.)

Q. Now, as I understood your testimony at Milwaukee, the cam shown in Exhibit MM was prepared to give the angles of the Gordon tool such as you have shown in the Exhibit NN, which as you stated contains a representation of the Ford Motor Company's cam F-446 enlarged ten times? A. Yes, sir.

Q. Now, will you take the Exhibit 212, on which there is the representation or outline of a cam, and I might state to you that that is a representation of the contour of one of the Ford F-446 cams, with an allowance of twenty-five thousandths to represent the size to which the cam would be turned on a Gordon machine, and that twenty-five thousandths being allowed for finish, and if you will place that on the cross-sectional outline of the cam on Ford drawing F-446, which is attached to Exhibit A and marked Exhibit 3, making the check on the view at the top of the sheet marked Section AA. Will you do that, please, Mr. Gordon? A. It appears to conform.

Q. While you are making that check, Mr. Gordon, I would like you also to check the locations of the centers of the various radii? A. It doesn't appear to be correct

here. I don't know why. Maybe I haven't got it lined up, but I think I have it lined up on the center lines in both directions, but that doesn't seem to check.

(186) Q. It checks in the position in which I now have it. You see this contour drawn on this Exhibit 212 is a little larger than the contour shown. A. If it checks there it doesn't check here on the center line. I brought it to the center line and it didn't check here. You have made it check there, and that pulls it off the center line.

Of course, I don't know just what you are leading to, whether that slight difference makes any material difference.

Q. Perhaps we better check this. I would like to call your Honor's attention that these cams are constructed and formed of a plurality of arcs which are tangent. The first arc is the one which constitutes the base circle, and then up the side of the cam you have an arc struck on the radius which is marked 2.525. Then when you get to the nose of the cam you have still the third arc which is a short, a very small circle, the radius being, as given on the blue-print, .00625, and Mr. Gordon and I were discussing that substantially 1/16 of an inch radius, that is correct, isn't it? A. Yes, sir.

Q. Now, perhaps it might be better if you will make that measurement, Mr. Green, as to the location of that center, and have Mr. Gordon check it.

The Master: Are there only 3 arcs in that particular cam?

Mr. Farley: 3 arcs, yes, sir. That is, 3 arcs in each half of the cam and the arcs on each side are exactly the same.

Mr. Green: The distance down from the center line, **(187)** Mr. Gordon, is given on this drawing as 909. I have a scale here. You can check that.

A. That is to this center?

Mr. Green: Yes.

A. Yes. That is very close to it. You are speaking of thousandths. You have got to guess. I don't know what he is leading up to and whether you demand any greater accuracy than that or not.

Mr. Green: This is 1.632, the other location of the center.

A. You are reading in terms of thousandths.

Mr. Green: No. 1.632.

A. One inch and six hundred thirty-two thousandths. You have got to guess as to just those thousandths. I don't think it makes any difference.

The Master: Why don't you go ahead with your examination and find out whether it does make a difference?

Mr. Farley: All right.

Mr. Green: I would say these were a little out according to the drawing, to the best of my knowledge.

Mr. Farley: All right.

A. That doesn't match up with the drawing, and that is what I meant when I said perhaps the drawing has shrunk from the original and doesn't correspond with the figures. That has been wet and stretched, probably, or shrunk.

Mr. Farley: Referring to the blue-print, the Ford blue-print?

A. Any blue-print.

Mr. Green: In your shop practice you generally work to **(188)** the dimensions as stated on the blue-print.

A. Yes.

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Q. (By Mr. Farley): Now, Mr. Gordon, considering your drawing Exhibit NN, you start with two, and I would say three, that is, three locating points, if I may put it that way, that is, starting at the point marked 65 on the left-hand side of your view, you start there with an established angle of the tool to the work of a 15-degree positive angle, that is correct, isn't it? A. That is correct, referring to the cutting edge in its relation to the contour of the work.

Q. Yes. A. Of the finished work.

Q. And now another locating point was the point directly in the middle of the sharp nose of the cam to which you have a vertical center line drawn and to which you have the inscription "Tool normal," that is also true? A. That is correct.

Q. And on the right-hand side of the cam you have a condition just as I described with the point 65 with a 15-degree positive angle, which is shown at the left of the cam? A. Yes, sir.

Q. Now, as I understood your testimony, you selected the 15-degree positive angle to begin with here, at the point on the left **(189)** marked 65, in order to bring the tool to the position, normal position, with the nose of the cam, and so that in the space between the 65 and the tool normal, you would get the various positions that you have indicated on your drawing, that is correct, too, isn't it? A. Yes, sir.

Q. Now, if you have a cam such as Exhibit 211, which corresponds in contour to the cam shown in the drawing Exhibit MM, and if with that cam on the plate model we have here, which is Defendant's Exhibit 57, if the condition of the 15-degree positive angle at the point 65, and the normal angle at the center of the nose of the cam, if those two conditions are fulfilled, together with the condition of the 15-degree positive at the point 65 on the right, then by the use of that cam we should get the same degrees or the same inclination of the tool to the work as you have shown in your drawing Exhibit NN, isn't that correct? A. Yes, provided, of course, that the mechanism that you show here corresponds to the mechanism on the machine. That I don't know. I haven't checked that up. This was only a general picture, as I assumed. I don't know whether the distances on this arc or the distance from the cam to this point, I don't know whether any of those will correspond with the real machine.

This was drawn up to represent what would happen in a machine similar to the machine that was provided to the Ford Motor Company.

I have no means of checking this to know. It is years **(190)** since I had anything to do with that, so I can only say offhand it doesn't look to me you have retained the dimensions on this that there was on the Ford machine, that is Exhibit 57.

Q. Did you ever change materially the dimensions of the frame piece swinging arms 23 during your manufacture of your machines? A. Yes, sir.

Q. What departure did you make when you changed those dimensions? A. As I remember the changes that were made, the material changes that were made was that in the first place we had—is that 34 or 84?

Q. 34. A. 34 represents the tool-holding block, referring to Exhibit 57.

This looks to me as though it were much smaller than the one we furnished the Ford Company, and if it is why then we must have changed the arm here to take care of the larger tool block, and if we took care of the larger block we would necessarily have to change this member here, 52, in relation from the point, fulcrum point, to the gear teeth that meshes with tool-holder block 34, and we also would find it necessary to change the dimension between the fulcrum point and the roller 53.

Q. You are changing the fulcrum point and roller? A. The distance between the two.

Q. Do you have with you the tool block that you produced at Milwaukee, I think it was introduced as Exhibit OO? A. I don't know whether we have it here. We have it somewhere in Detroit. It is in the hotel, I think.

(191) Mr. Spohn: We have that.

Q. We have here a tool block from a Gordon machine. A. I would say that was one of the early machines. It looks like it from size.

Q. Did you make any change in the dimensions of that part? A. Oh, yes. I just explained that as I remember we made an entirely new tool block, much larger in diameter, which necessitated these other changes.

Q. Was your Exhibit OO which you introduced at Milwaukee one of that type, one of the later ones? A. What was Exhibit OO?

Q. I think Exhibit OO was another tool block. A. If that is what we exhibited over there, I am quite sure it was a Ford machine, or used for the Ford machine, or similar to it.

Q. Now, you maintained, however, in all the machines, did you not, the equal distance between the pivot point and the gear sector 54 of the bell crank lever 52, and the dis-

tance to the center of the roller? A. They have been changed, but whether they were ever corresponding in dimension, I couldn't remember that.

Mr. Michael: You mean corresponding to Exhibit 57.

A. No, the distance from the fulcrum point to the pitch line of the teeth in the gear and corresponded in distance to the center line or the fulcrum point and the center of the roller pin 53.

Q. You made some mention during your testimony, as I recall it in Milwaukee, of having some sort of a jig or fixture which **(192)** you used to determine the proper contour of the tilting cam. Am I correct in my recollection on that? A. We did when we were producing those. They did not belong to us. They belonged to the concern that was manufacturing our machines.

Q. You did not use a jig of that type, however, to produce the drawing Exhibit MM, is that correct? A. No, sir.

Q. How did you produce that drawing Exhibit MM, do you know? A. We had to use all of the elements that went into this mechanism there and worked them up, developed them so that we could make a drawing such as Exhibit MM.

Q. It was necessary for you in making that drawing then to consider the distance from the center of the shaft 24 to the point of the tool 37, was it not? A. Surely. That is one of the, only one of the elements. There are many elements that entered into it.

Q. Do you know what dimensions you used for that, for preparing these two drawings? A. I couldn't remember that.

Q. Have you got any way of determining that, finding it out? A. What is that?

Q. Let me put it this way: Will you supply us with the data concerning that? We would like to have you supply us with the dimensions you used in the preparation of these drawings, Exhibits MM and NN, of the distance from the center of the shaft 24 to the point of the tool, when the tool is on the base circle. Will you make that notation? **(193)** A. That wouldn't make any difference where it was. The point of the tool is constant in relation to the center here.

Mr. Michael: What he wants, Mr. Gordon, are your work sheets, your dimensions you used.

A. The center is here.

Mr. Michael: He wants anything that may have entered into the figuring out of the cam.

A. I haven't got it here.

Q. I would like to have that, and I also would like to have the dimensions of the work piece 34. I would like to have the dimensions of the crank arm 52, with the location of the pivot point and the distance of the—the dimensions that would locate the center of the shaft upon which the cam 43, the contour cam and tilting cam, those distances being given from the—I would say from the location of this pivot when the part is on the base circle, and also from the center of rotation of the work. Do you understand? A. I think I understand. I think we can get what we call a manual showing the steps necessary.

Q. These dimensions I have just given you will be the requisite ones, and I would like in addition for you to supply us with all of the material dimensions, outlines, that you used in the preparation of these two drawings, that is, every factor of the dimension which you took into consideration in the preparation of these drawings, do you understand? A. Yes, sir. In other words, you want the data that we used to prepare that?

Q. Yes, and the method and means by which you prepared them. Now, **(194)** assume that we have here a correct representation of the dimensions of the Gordon machine and suppose that we begin with the parts in the position they are now in, in which the cutting edge of the tool is shown on the nose of the cam in a position there similar to that shown by the vertical line on this drawing Exhibit NN, and to which the inscription "Tool Normal" is given. Will you look at the model before you and state whether or not the tool is normal to the work at that point?

Mr. Michael: I think that is a rather violent assumption to base a question on, in view of Mr. Gordon's testimony.

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Q. I might state for your convenience the upper of the lines of this outer plate is a line which extends parallel with the cutting edge of the tool. A. And it also passes through the center of the work?

Q. Yes. A. That necessarily makes it normal then to the work, the cutting edge of the tool normal to the work.

Q. Now, Mr. Gordon, I call your attention to this lower line here on the outer plate that passes through the point of the tool where the tool contacts with the work, and it also passes through the center or axis of rotation, and it coincides with the center of the arc where the tool is now about to begin cutting, isn't that true? A. It appears to be that way.

Q. Would you mind taking the protractor and state whether or not that line is 15 degrees?

(195) The Master: One from the other?

A. This is the line?

Q. That is the line. A. It is approximately. It looks a little bit more than 15 degrees from that line to this line, —that is what you are speaking of?

Q. It looks to me like it is right on the 15. A. It is not on the 15, but it is approximately there. This is a pretty crude arrangement to get any very accurate measurements.

Q. With that setting, that corresponds to the position 65 at the left-hand side of your Exhibit NN, with the tool at a 15-degree positive rake? A. I don't just get the lines you have got that would indicate it is on 65 degrees.

Q. Here it is here. 65. A. Approximately. Of course, that is only approximate. That isn't anywheres near accurate.

Q. It is off how much? A. It is off where? At this point?

Q. It is not off more than a portion of a degree, or something like that? A. It might be off a degree or two degrees. It could be brought around, however, to as near as your instrument will show exactly there. That would be mid-way. You can't see unless you are looking directly toward it. That is much closer in. Of course, you have got a line here that is 1/32 of an inch wide, corresponding with a line very much narrower.

(196) Q. Now, the model as now set then complies with the 15-degree positive condition for your point 65, isn't that true? You just measured the angle between the heavier line on this outer blade and the finer one and you found that to be 15 degrees. The heavier line passes through and is parallel with the uppercutting edge of the tool? A. It is approximately that, yes. It is pretty hard to say.

Q. The lower line, however, would indicate the condition as shown here, that your tool instead of being on the normal, the lower line is the line which in that position of the parts is normal? A. I haven't determined in my own mind yet why this line here isn't a horizontal line. It seems to me much lower here than there. It may be I am not looking at right.

Q. That is due to the fact that we are passing around. A. Have you passed off the base circle?

Q. We have got to the point here where we are above the horizontal line. A. You have passed.

Q. Here is the line running across there, here we are right on the base circle. A. I was trying to find out. It seems to me that base circle runs around to here, but that should be a horizontal line. That is the way it looks to me. That 65 degrees there is the point at which the nose of the cam begins to depart from the base circle, and that is considerable. 2½ degrees, and we have got 65 degrees. We are considerable down there.

Q. Let's see if we can get this horizontal. Now, I am holding **(197)** your drawing about in the same position, and this line, which is the upper heavier line, will be represented by this plate line that runs at that angle, and this other line. Neither one of those lines, if you put this to the corresponding position to the parts here, would be horizontal, if they were continued on your drawing, would they? A. This line here is a radial line that passes right through the center. If it is on the cylindrical part of the cam, the base circle, as soon as it departs from the base circle, of course it doesn't run through the rotative center.

Q. That will vary by the tilting of the tool here, will it not? A. Surely, that is what the action of this cam is, to tilt the tool to conforms to certain positions.

Q. As that tool is tilted it will move that line away from the horizontal position as I illustrate there.

The Master: Is the line horizontal all the way around the base circle? Is it supposed to be?

Mr. Green: It stays constant. May I have a question?

Mr. Farley: Yes.

Mr. Green: Isn't it true that the distance from this point of the tool to the pivot point up here isn't necessarily equal to the distance from the center of rotation to the pivot? As I remember the layout of this machine, the distance from the point of the tool to this pivot is slightly less distance from the center of rotation to this pivot. Therefore that would account for your extra, you say, variation.

A. I don't believe it is. I won't say positively, but it was my impression that that was the same distance from the point of the tool to the center of this four-inch shaft No. 24 was **(198)** the same distance as it is from the center of the work to the center of the shaft.

Mr. Green: Assuming that it is, if this is an arc and the arc moves from the vertical, or the radius is turned, assumed to be turned from a vertical position around an arc, wouldn't that raise it slightly from here to here?

A. It wouldn't raise the point. It would raise the entire mechanism if this were a vertical line there and if you departed from that vertical line it would swing upward slightly.

The Master: If you drop a vertical line down here would each of these points be equi-distant from the vertical line of your machine?

A. Which points?

The Master: The two points you are talking about here.

A. This point is a fixed point in relation to this point. That is, the center of member 24 and the point of the tool is a fixed distance between those two members. It is also true in reference to the center of the work and the center of 24. That is a fixed distance which never changes.

The Master: Are those exactly equal?

A. I think they are. Mr. Green said they were different.

Mr. Green: It is my recollection that this model, that there is a slight difference in the distance from the point of the tool.

A. In the model.

Mr. Green: And as I remember the checking it seems to me I remember definitely checking the machine. I wouldn't be **(199)** definitely sure about that.

A. Did you check the center of the bearing that carries the tool block?

Mr. Green: Yes, that distance corresponds with the center of the tool.

A. It is supposed to, but I don't know whether it could.

Mr. Farley: I might say we checked these with parts which we have in the office of a Gordon machine, and they correspond.

Mr. Michael: This lay-out was supposed to represent a Gordon machine. Why don't you defer all of this until you get Mr. Gordon's work sheet?

Mr. Farley: I am quite willing to do that. I am quite willing to do that. Of course, our point here is that if you have the main locating points and you fulfill the requirements of the main locating points with the cam, and this cam does correspond 100 per cent with Mr. Gordon's drawing of the cam as contained in the Exhibit MM. Now, if we make a cam in accordance with that drawing, and we find that it coincides at the three reference points and gives the same result, then there can't be any appreciable variation between the plate model and the part from which this drawing is made. That is, your three reference points will locate the thing. The location then there fulfills the requirements here, but it does not fulfill the requirements at all when we get to the crucial part.

Mr. Michael: He is explaining the variation in dimensions.

(200) A. Supposing I were to take 1/16 of an inch off this cam in here I wouldn't disturb the points, the three

points you are speaking of, but I would disturb it in between those points.

Q. (By Mr. Farley): That is right. A. And the shape of this cam is to put the tool in just as shown on that drawing.

Q. If you take these three locating points, and you keep the contour of the connecting line between those two locating points exactly as shown in your drawing, and follow the same dimension, if we get the same result at the two locating points, which is on the line 945 of Exhibit MM, then we get the same result at the line marked O, and then if this cam is precisely the same contour of the model Exhibit 211 as it is on your drawing Exhibit MM, we should of necessity then get the same result as you have depicted in your drawing?

Mr. Michael: Not at all, unless your dimensions in the mechanism are the dimensions used. Not at all. It is perfectly clear.

Mr. Farley: I don't think it is, but we will be pleasantly disagreeable about that.

A. It is a fact nevertheless.

Q. (By Mr. Farley): If you will furnish us then with the complete data by means of which you got the results shown in the Exhibit NN in the use of the cam such as shown in Exhibit MM, we would like to have the opportunity of checking that. A. I think we can probably.

(201) Mr. Farley: And I will defer examination on that particular point.

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(202) Todd L. Moise was thereupon recalled as a witness, and having been previously duly sworn, resumed the stand and testified further as follows:

Cross Examination by Mr. Farley.

Q. You are the same Todd L. Moise who testified formerly in the Case? A. Yes.

* * * * *

(228) Q. Do you remember your cross examination, Mr. Moise, concerning the use of the straightening operation? A. I remember your bringing that question up.

Q. Yes. A. And asking me some questions about it.

Q. Yes. Now, have you got—now, let me see page 3 of Exhibits "Z" and "Z'." A. Yes.

Q. The figures taken there were posted over from page 4? A. Yes.

Q. And from page 5? A. Yes.

Q. And from page 6; that is correct? A. Pages 4 and 5 were made from page 6, and so forth.

Q. Have you got that Exhibit "Z" that you had before you when you were on the stand before? A. I have.

Q. You made certain penciled corrections to those figures during the cross examination before. Did you make the same penciled corrections upon the corresponding sheets of Exhibit "Z'"? A. I did not make penciled corrections. You asked me if that was included how much difference that would make in the amount of the damages or of the amount of the profit, and I figured that up roughly at the time. I have since gone more carefully into the amount the difference which that would make if it was included, and if you wish, I can give you that amount as I see it, which, of course, would make a more adequate correction if it is to be corrected.

Q. Yes. When you prepared Exhibit "Z'," however, you did not **(229)** include any of the figures that you penciled on sheets 6, or 5, or 4, of Exhibit "Z," is that correct? A. That is true.

Q. Now, if a straightening operation were required on the Melling machines and such a straightening operation were not required on the shapers, there should be a revision of the figures as contained in your report, should there not? A. It would reduce it, but as I figured it, I would give you the amount if that proved to be the case, and it is so ruled.

Q. Well, will you take your sheet 6 of Exhibit "Z'"? A. Yes, sir.

Q. And, in the column "Man Hours Per Shaft," the 4th column from the right of the page, under the heading with "Melling Machines," the time "Man Hours Per Shaft" is given as .01333? A. Yes.

Q. .01333? A. Yes.

Q. And, will you add to that the time for the straightening operation? A. No, I couldn't do it that way. Of

course, that is based purely on so many shafts per hour divided the way in which these corrections—if I did, as an accountant, if I would make that correction, would be to my experience, the corrections of .50 minutes per shaft, and having found the cost of .50 minutes per shaft as I have done it from and by experience, I would extend that by the cost per minute of labor and overhead, and so arrive at a difference for each year which would reduce the profit by a total of—if you wish it, as I have it, subject to check, of $51,240.60.

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(232) Q. (By Mr. Farley): I see. Well, your answer was that it would reduce the profits $51,000. Now, the computation, you mean, Mr. Moise, had only to do, did it not, with the figure obtained by you and given by you as $42,719.94? A. Yes.

Q. That is, you changed that $42,000, which you have put there as a saving through use of the Melling cam lathes, and that becomes, through conversion, that figure, instead of a savings, **(233)** into a loss of some $9,000, isn't that true? A. That would convert that into $8,520.66 loss.

Q. Loss? A. Yes, if that is used.

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(245) Q. Now, on page 2 of your own account, both as originally submitted and as amended, you have this:

> "Burden ratios used are probably too low, as, for most periods, data from which the ratios could be determined, was not supplied by defendant for many of its low production months."

Now, insofar as there was a great deal of talk about burden and burden ratios on cross examination by Mr. Spohn, but if the straightening operation were taken into account **(246)** throughout these computations and the figures show a loss rather than a profit the use of the overhead burden ratios as used in the cost summary cards of the Ford Company would increase rather than decrease the loss? A. Yes, certainly, but that would make no difference in trying to get at the truth.

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(247) Q. (By Mr. Farley): When it comes to the question of burden as given by the overhead burden figures which you have used throughout your computations, would that burden, overhead burden figure include a large number of items; that is right, isn't it, Mr. Moise? A. Probably.

Q. Yes. Such as maintenance, space, depreciation, repairs, taxes, and so on? A. Yes; supplies and numerous other things.

Q. Yes. Now, if as in the matter we are now considering, you are going to compare the cost of two different machines used in the same department—you follow that? A. Yes.

Q. And one machine, we will say, let us say, to make it simple, cost twice as much as the other machine. Now, in determining burden it would be better and more accurate, would it not, to figure depreciation according to the costs of those respective machines rather than taking the lump sum burden figure which applies to the whole department, and in which there are 45 or more different operations, is that true? A. Providing you knew that the life of the two machines were the same, and also based on the cost of production on the machine.

Q. Yes, yes. A. It might be the ideal way to do it.

Q. Yes. And, it would be the ideal way to do it insofar as maintenance and every other one of the larger items, repairs, tool costs, etc., were involved, that is true, isn't it? A. I may say that if you could get a sufficient number of the important **(248)** items to fairly get the true cost of them when one machine is compared with the other.

Q. Yes. A. That would be the way to do it.

Q. Yes, that is right. A. But not to take a few when you could not get all the important ones.

As you know, many companies carry machine cost in which they allocate cost of overhead to each machine. That makes this kind of thing relatively simple. But that was not done by the Ford Motor Company.

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